**Montana Department of**
**ENVIRONMENTAL QUALITY**

Brian Schweitzer, Governor
Richard H. Opper, Director

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

MAILED
6-2-11

June 1, 2011

Ms. Gayle McPherson
**CITY OF BIG TIMBER**
PO Box 416
Big Timber, MT 59011

RE: **CLOSED CITY OF BIG TIMBER LANDFILL – SWEET GRASS COUNTY – LICENSE #308**
**FEBRUARY 2011 POST-CLOSURE GROUNDWATER MONITORING REPORT**

Dear Ms. McPherson:

The Solid Waste Program has reviewed the February 2011 groundwater monitoring report for the Closed City of Big Timber Class II Landfill in Sweet Grass County, Montana. The groundwater monitoring report meets the requirements of the Administrative Rules of Montana Title 17, Chapter 50, Subchapter 13.

As specified in the 2007 Post-Closure Care Plan, groundwater monitoring at the facility may be discontinued at this time. One additional groundwater monitoring event will be required prior to final release of the site from post-closure care in 2027. Please continue to inspect and maintain the groundwater monitoring wells until that time.

If you have any questions, comments, or concerns, please contact me in the Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Section.

Sincerely,

Martin Van Oort
Environmental Science Specialist
Solid Waste Program
*Phone: 406-444-2802, Fax: 406-444-1374*
*E-mail: mvanoort@mt.gov*

cc: Mr. Jeff Rice, Tetra Tech, PO Box 30615, Billings, MT 59107

File: Closed\Sweet Grass Co.\City of Big Timber Class II\License #308\Groundwater Monitoring
Path: G:\WUT\SWS\GWater\Responses\Sweet Grass Co\2011-02_Big_Timber_GW.docx

## Correspondence Slip

Originator: MVD

Date Requested: 5/26/11

Date Needed By: 6/1/11

REVIEW ROUTING

| Name | Task | Initial/Date |
|---|---|---|
| Admin | Proof | DE, 5/27/11 |
| Mary H | Review | 5-31 |
| Bruce | | 5-31-11 |
| Rick | ↓ | R, 6-1-11 |

Mail original via: [✓ Regular] ○ Certified ○ Registered ○ FedEx

Fax to addressee at:

Proof Path: G:\WUT\ see letter

Mail copy of enclosures to CC's? Y [✓ N]

Copies of enclosures for file needed? Y [✓ N]

Copy of letter for file needed? [✓ Y] N

Email copies sent? Y [✓ N]

**Special Instructions**:

EMAIL copy sent to Project Originator? Y N

---

Closed

County Sweet Grass

Facility & # Big Timber #308

Closure
Finan Assur
GW Corr Meas
[✓ GW Monitoring]
GW Reports
Inspections
Other: ______

Landfarm
Liner
Methane
O & M
Run-on

**Van Oort, Martin**

**From:** Stepp, Tim
**Sent:** Friday, January 28, 2011 9:03 AM
**To:** Rice, Jeffrey
**Cc:** Van Oort, Martin
**Subject:** RE: 2011 Groundwater & Methane Monitoring

Jeff,

The timing is fine. We appreciate the previous notice of final cover repairs. Our response to the last FA submittal will be mailed shortly.

Please direct all future monitoring notices to:

Martin van Oort
MVanOort@mt.gov
406.444.2802

Thanks for the notice.

Tim

**TIM STEPP**
Environmental Engineer - Solid Waste Program
Waste & Underground Tank Management Bureau
Permitting & Compliance Division

Montana Department of
ENVIRONMENTAL QUALITY

Lee Metcalf Building
1520 East Sixth Ave
P.O. Box 200901
Helena, MT 59620-0901

Phone 406-444-4725
Fax 406-444-1374
email: tstepp@mt.gov

---

**From:** Rice, Jeffrey [mailto:Jeffrey.Rice@tetratech.com]
**Sent:** Thursday, January 27, 2011 2:47 PM
**To:** Stepp, Tim
**Cc:** City of Big Timber
**Subject:** 2011 Groundwater & Methane Monitoring

Mr. Stepp:
Per MDEQ requirements we are notifying you of our intent to conduct the 2011 monitoring and inspection of the former Big Timber Landfill. Weather permitting we intend on conducting the week in one week ( February 2 or 3, 2011). Should this not be acceptable to MDEQ we can adjust our schedule per your wishes.
Please let me know if this is acceptable.
Thanks
Jeff

**Jeff Rice** | **Billings Environmental Group Manager**
Main: 406.248.9161 | Fax: 406.248.9282 |Cell: 406.671.4851

**Tetra Tech** | Complex World, Clear Solutions™
618 South 25th Street | Billings, MT 59101 | www.tetratech.com

PLEASE NOTE: This message, including any attachments, may include privileged, confidential and/or inside information. Any distribution or use of this communication by anyone other than the intended recipient is strictly prohibited and may be unlawful. If you are not the intended recipient, please notify the sender by replying to this message and then delete it from your system

MAILED
6-23-09

**Montana Department of**
**ENVIRONMENTAL QUALITY**

**Brian Schweitzer, Governor**

**P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov**

June 22, 2009

Mr. Rick Gibby
**CITY OF BIG TIMBER**
PO Box 416
Big Timber, MT 59011

RE: **CLOSED CITY OF BIG TIMBER BIG TIMBER LANDFILL – SWEET GRASS COUNTY – LICENSE #308**
**MARCH 2009 POST CLOSURE GROUNDWATER MONITORING REPORT**

Dear Mr. Gibby:

The Department has reviewed the March 2009 Post Closure Groundwater Monitoring Report for the Closed City of Big Timber Class II Landfill in Sweet Grass County, MT. The report meets the requirements of the Administrative Rules of Montana (ARM) 17.50.708.

The August 2007 Amended Post-Closure Care Plan stipulated that methane monitoring would be conducted during the groundwater monitoring events in 2009 and 2011, however no methane monitoring results were presented in this report. If these results were omitted in error or are to be submitted under a separate cover, please submit them to the Department at your earliest convenience. If methane monitoring was not conducted, please complete methane monitoring and submit the results to the Department by August 21, 2009.

The facility remains in biennial detection monitoring at this time. If you have any questions, comments, or concerns, please contact me in the Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Section.

Sincerely,

Martin Van Oort
Environmental Science Specialist
Solid Waste Program
*Phone: 406-444-2802, Fax: 406-444-1374*
*E-mail: mvanoort@mt.gov*

File: Closed\Sweet Grass Co.\City of Big Timber Class II\License #308\Groundwater Monitoring
Closed\Sweet Grass Co.\City of Big Timber Class II\License #308\Methane Monitoring
Path: G:\WUT\SWS\GWater\Responses\Sweet Grass Co\2009-03_Big_Timber_GW.doc
cc: Mr. Jeff Rice, Tetra Tech, PO Box 30615, Billings, MT 59107

## Correspondence Slip

**oject ID:**

**Requested:** 6/18/09

**Needed By:** 6/22/09

**Originator:** MVP

**Org(s)/Mail Code:**

REVIEW ROUTING

| Name | Task | Initial/Date |
|---|---|---|
| Admin | Proof | 6-18 |
| MaryH | Review | 6-16 |
| Darrell | Review | 6/22 |
| Rick | Review | 6-22-09 |

**Mail original via:**
☒ Regular ○ Certified ○ Registered ○ FedEx

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Proof Path: G:\WUT\ see letter

**Special Instructions:**

copy of letter in GW
& methane files

Mail copy of enclosures to CC's? Y [✓ N]

Copies of enclosures for file needed? Y [✓ N]

Copy of letter for file needed? [✓ Y] N

MAILED
11-01-07 Gh

**Montana Department of**
**ENVIRONMENTAL QUALITY**

**Brian Schweitzer, Governor**

**P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov**

November 1, 2007

Mr. Rick Gibby
**CITY OF BIG TIMBER**
PO Box 416
Big Timber, MT 59011

**RE: CLOSED BIG TIMBER SANITARY LANDFILL - LICENSE #308**
**AUGUST 2007 GROUNDWATER MONITORING REPORT REVIEW**

Dear Mr. Gibby:

The Department has reviewed the Closed City of Big Timber Class II Landfill's August 2007 groundwater monitoring report. The report meets the requirements of the Administrative Rules of Montana (ARM) 17.50.708. As a reminder, in correspondence dated September 6, 2001, the Department provided conditional approval for the performance of groundwater monitoring at the facility once every two years, in the absence of detected contaminants. However, because sampling requirements had been overlooked for a period of approximately 6 years, the Department extended the groundwater monitoring requirements for the facility 6 years. Therefore, at least two more monitoring events, one during 2009 and one during 2011, remain for the facility.

If you have any questions, comments or concerns, please do not hesitate to contact me in the Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Section.

Respectfully,

Mary Louise Hendrickson

Mary Louise Hendrickson
Environmental Science Specialist
Solid Waste Regulatory Program
*Phone: 406-444-1808; Fax: 406-444-1374*
*E-mail: mhendrickson@mt.gov*

File: Closed\Sweet Grass County\City of Big Timber Class II\License#308\Methane Monitoring
Path: G:\WUT\SWS\GWater\Responses\Sweet Grass\BigTimber-GW0807review.doc
cc: Mr. Jeff Rice, Tetra Tech, PO Box 30615, Billings, MT 59107

## Correspondence Slip

**Project ID:** ____________

**Requested:** 10-29
**Needed By:** 10-29
**Originator:** Mlk
**Org(s)/Mail Code:** ____________

REVIEW ROUTING

| **Name** | **Task** | **Initial/Date** |
|---|---|---|
| Admin | Proof | Jh / 10-29-07 |
| Darrell | review | Das / 10/29 |
| Rick | | RT / 11-1-07 |
| | | / |

**Mail original via:**
● Regular ○ Certified ○ Registered ○ FedEx

**Fax to addressee at:**

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**Special Instructions:**

Mail copy of enclosures to CC's? Y N

Copies of enclosures for file needed? Y N

Copy of letter for file needed? [✓ Y] N

Montana Department of
ENVIRONMENTAL QUALITY

Marc Racicot, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • E-mail: www.deq.state.mt.us

MAILED
9-13-01 Jh

September 6, 2001

Mr. Willy Littell
City of Big Timber
P.O. Box 416
Big Timber, Montana 59011

**RE: BIG TIMBER CLASS II (CLOSED) LANDFILL, SWEETGRASS COUNTY, LICENSE NO. 308** GROUND WATER MONITORING –RECEIPT OF THE APRIL 27, 2001 SAMPLING EVENT DATA

Dear Mr. Littell:

We respect your desire to terminate ground water monitoring at this site as soon as possible. If you recall, a letter from the Program dated August 12, 1999, set forth a ground water monitoring schedule that we felt was fair and in conformance with rule ARM 17.50.721(2).

Once again let us reiterate, this rule specifically establishes at a minimum, a 30-year post closure monitoring timeframe, with a clause giving the Program authority to approve a reduced sampling frequency. In our August 1999 letter, we requested at least 6 valid consecutive sampling events at the Big Timber Landfill site. Big Timber is just 2 sampling events (1 year) from meeting this requirement. Assuming no exceedances have been detected, a drastically reduced sampling frequency could then be considered to meet the 30-year post closure ground water monitoring rule requirement.

Your accelerated request to terminate sampling/monitoring in comparison to ours is only a difference of one year. It is not uncommon for transmissivities and travel times to vary by a range of 1 to 5 years, or more. We believe our original judgment was a fair one. However, in an effort to remain flexible and still protect human health and the environment, we will immediately approve a reduced sampling frequency. The Big Timber Landfill will only be required to sample the ground water every 2 years, in the spring. Therefore, in the spring of 2003, the quality of the ground water in the facility wells will need to be sampled and the results evaluated.

I may be contacted at the Permitting and Compliance Division, Community Services Bureau, Waste Management Section, phone (406)444-0538.

Sincerely,

Pat Potts

Pat Potts
Environmental Specialist – Solid Waste Program
cc: Maxim, Billings, MT

INITIALS $P^3$ DATE 9/11/01

**SW OUTGOING CORRESPONDENCE 2001**

☐ **NEW APPLICATION/LICENSE** **Initial / Date**
Mike D.
Janet H.
HAC
Rick T.
Jon D./ Other

☐ **HEALTH OFFICER CARD** **Initial / Date**
Mike D.
Karen
HAC

☐ **INSPECTIONS** **Initial / Date**
Pat C.
Janet H.
Karen
Rick T.

☐ **CLOSURES** **Initial / Date**
Mike D.
Janet H.
Karen
HAC
Rick T./ Other

☐ **FEES** **Initial / Date**
Mike D.
Janet H.
HAC

☐ **COMPLAINTS** **Initial / Date**
Pat C.
Janet H.
Karen

☑ **GROUND WATER** **Initial / Date**
Janet H. JH 9-11-01
Pat C PC — 9/11/01
Rick T. RT 9-11-01

☐ **GENERAL CORRESPONDENCE** **Initial / Date**
Pat C. / Mike D.
Janet H.
Rick T.
Jon D./ Other

☐ **MISCELLANEOUS** **Initial / Date**

**FILE**
**Path**

Sweetgrass Co
Big Timber Ldfil (closed) #308
grd wtr mon (Colleap)

Sweetgrass Co
(closed) Big Timber #308
grd wtr mon (corresp)

MAXIM
TECHNOLOGIES INC®

Consulting Engineers & Environmental Scientists
618 South 25th Street
P O Box 30615
Billings, MT 59107

Telephone: (406) 248-9161
Fax: (406) 248-9282

January 19, 2001

Ms. Pat Potts
Montana Department of Environmental Quality
Solid Waste Regulatory Program
P.O. Box 200901
Helena, Mt 59620-0901

**Subject:** **Response to MDEQ Comments**
**Review of the October 18, 2000 Sampling Event**
**Big Timber Landfill**
**Maxim Project No. 9731053.100**

Dear Ms. Potts:

This letter is presented in response to your correspondence dated December 18, 2000 to Mr. Willy Littell of the City of Big Timber. Presented below are the issues raised in your letter, followed by our response.

***Comment #1:***
*"Where have all of the metals gone? Previous sampling events have detected low levels of several metals in most of the monitoring wells. The only metal detected in the October 2000 event was iron in BT-1S."*

***Response:***
The metals detected during previous sampling events were at low concentrations at near the laboratory detection limits. We cannot respond to "where the metals went" other to offer that the lack of trace metals detected is likely due to groundwater variability. No changes in sample or laboratory procedures were conducted for this monitoring event.

***Comment #2:***
*"What is the correct COD value for the duplicate sample analyzed from BT-1s; 0.7 mg/L as used in the report text and calculations, or 7 mg/L as found on the analytical data sheet?"*

***Response:***
The chemical oxygen demand (COD) concentration of the duplicate sample was 7 milligrams per liter (mg/L). The COD concentration of the natural sample was 5 mg/L. Revising these concentrations does not change the laboratory quality assurance/quality control results or regulatory status of the City of Big Timber Landfill.

If you have any further questions please call us at (406) 248-9161.

Sincerely,

**Maxim Technologies, Inc.®**

Brian H. McHugh
Brian H. McHugh, P.G.
Office Manager

Jeffrey R. Rice
Environmental Group Manager

BMc(JRR)rr

cc Mr. Willie Littell - City of Big Timber
Mr. Erl Tufte - Morrison Maierle

n:\typing\envir\9731053\mdeqresp.wpd

RECEIVED
JAN 25 2001
MONTANA
DEPT. OF ENVIRONMENTAL QUALITY
COMMUNITY SERVICES BUREAU

Sweetgrass Co
Big Timber #308
(closed)
Grd wtr mon (corresp)

# City of Big Timber

P.O. Box 416
Big Timber, Montana 59011

Clerk (406) 932-5610
Treasurer (406) 932-5611

December 28, 2000

Ms Pat Potts
Environmental Specialist
Solid Waste Regulatory Program
MT Dept. of Environmental Quality
P.O. Box 200901
Helena, MT 59620

RE: Big Timber Class II Landfill

Dear Ms. Potts:

This letter is in response to your correspondence of December 18, 2000. The City is pleased with your report regarding VOCs. As you know, the landfill has been closed for about two years and we are anxious to complete documentation for final closure.

You raised a number of questions regarding the latest sampling event. As we did about a year ago, we are referring these to the City's contracted testing firm, Maxim Technologies. By copy of this letter, we request that Maxim respond directly to your letter. To repeat what we stated a year ago, "we need professional support and teamwork" from experts like yourselves. We also commented that much of this is "beyond the working knowledge of a small town."

We do not want to avoid our responsibility, but we hope that Maxim and the DEQ will communicate directly regarding your concerns. We agree with your comment that a lot of time, effort and money go into each sampling event and that this should be taken seriously.

For the record, please note that Mr. William Littell has been appointed to the position of Public Works Director. Mr. Ron Thomas has retired.

Sincerely,

Gary Smart

Gary Smart, Mayor
City of Big Timber

cc: Jeff Rice, Maxim Technologies

RECEIVED RT
JAN 05 2001
MONTANA
DEPT. OF ENVIRONMENTAL QUALITY
COMMUNITY SERVICES BUREAU

Montana Department of
**ENVIRONMENTAL QUALITY**

Marc Racicot, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • E-mail: www.deq.state.mt.us

December 18, 2000

Mr. Willy Littell
City of Big Timber
P.O. Box 416
Big Timber, Montana 59011

**RE: BIG TIMBER CLASS II (CLOSED) LANDFILL, SWEETGRASS COUNTY, LICENSE NO. 308** GROUND WATER MONITORING – REVIEW OF THE OCTOBER 18, 2000 SAMPLING EVENT

Dear Mr. Littell:

It is encouraging to note that there have been no VOCs detected at this landfill site for some time. Three of the 6 required detection monitoring events have been completed. However, there are some sampling and reporting peculiarities that we would like to bring to your attention concerning the Fall 2000 sampling event:

- Where have all of the metals gone? Previous sampling events have detected low levels of several metals in most of the monitoring wells. The only metal detected in the October 2000 event was iron in BT-1S.

- What is the correct COD value for the duplicate sample analyzed from BT-1S; 0.7 mg/L as used in the report text and calculations, or 7 mg/L as found on the analytical data sheet?

A lot of time, effort, and money go into each sampling event. To overlook data irregularities and reporting errors would be remiss on our part. Should you find answers on the above bulleted items, we would appreciate a response.

I can be contacted at the Permitting and Compliance Division, Community Services Bureau, Waste Management Section, phone (406)444-0538.

Sincerely,

Pat Potts

Pat Potts – Environmental Specialist
Solid Waste Regulatory Program

cc: Ron Thomas, Public Works Dept., City of Big Timber, P.O. Box 416
Jeff Rice, Maxim, P.O. Box 30615, Billings, MT 59107
Rod Fink, P.O. Box 111, Columbus, MT 59019

3

INITIALS [redacted] DATE 12/14/00

**SOLID WASTE OUTGOING CORRESPONDENCE ROUTE SLIP**

| | |
|---|---|
| ☐ **NEW APPLICATION** | **Initial / Date** |
| Mike D. | |
| HAC | |
| Christy | |
| Rick T. | |
| Jon D./ Other | |
| ☐ **NEW LICENSE** | **Initial / Date** |
| Mike D. | |
| HAC | |
| Karen | |
| Christy | |
| Rick T. / Other | |
| ☐ **HEALTH OFFICER CARD** | **Initial / Date** |
| Mike D. | |
| Karen | |
| Christy | |
| ☐ **INSPECTIONS** | **Initial / Date** |
| Pat C. | |
| HAC | |
| Karen | |
| Rick T. | |
| ☐ **INTERIM CLOSURES** | **Initial / Date** |
| Mike D. | |
| HAC | |
| Karen | |
| Christy | |
| Rick T./ Other | |
| ☐ **CLOSURES** | **Initial / Date** |
| Mike D. | |
| HAC | |
| Karen | |
| Christy | |
| Rick T./ Other | |
| ☐ **CHANGE IN LICENSE FOR FEE STATUS** | **Initial / Date** |
| Mike D. | |
| HAC | |
| Christy | |
| ☐ **COMPLAINTS** | **Initial / Date** |
| Pat C. | |
| HAC | |
| Karen | |
| ☑ **GROUND WATER** | **Initial / Date** |
| ~~HAC~~ Jh | Jh 12-14-00 |
| Pat C | PPC 12/14 |
| Rick T. | RT 12-15-00 |
| ☐ **GENERAL CORRESPONDENCE** | **Initial / Date** |
| Pat C./ Mike D. | |
| HAC | |
| Rick T. | |
| Jon D./ Other | |
| ☐ **MISCELLANEOUS** | **Initial / Date** |
| **FILE** | |
| **Path** | |

Sweetgrass Co
Big Timber #308
grd wtr (corresp)

**City of Big Timber** *City letterhead*
P.O. Box 416
Big Timber, Montana 59011

Phone
Clerk: 406-932-5610
Treasurer: 406-932-5611

COPY

Tim Stepp
Solid Waste Program
Montana Department of Environmental Quality
PO Box 200901
Helena, Montana 59620-0901

RE: Big Timber Landfill Post-Closure (License #308)

Dear Tim,

As you know the new council has had to update itself as to its responsibilities regarding post-closure monitoring. We apologize for the delay in monitoring and want to inform you that on February 19, 2007 we obtained a quote form Tetra-Tech (formerly Maxim Technologies) to provide the requested monitoring.

The City requested that Great West Engineering, the City's engineer, look over the recent correspondence with the DEQ and Tetra-Tech to provide a recommendation. On March 20, the engineer indicated that the monitoring was required and that costs were reasonable. It is now the City's intent to move forward on conducting this monitoring as soon as possible.

We also note that the deadline for monitoring compliance was April 1, 2007. We request that you consider our recent efforts and permit us an extension of approximately 6 months for the completion of monitoring.

Thank you for your consideration. Please call if you need anything.

Sincerely,

Diana Taylor
The City of Big Timber
Diana Taylor, Mayor

RECEIVED
MAR 23 2007
DEPT. OF ENVIRO. QUALITY
WASTE & UNDERGROUND TANK
MANAGEMENT BUREAU

County Closed Sweet Grass
Facility & # City of Big Timber
#308

Closure
Finan Assur
GW Corr Meas
[✓ GW Monitoring]
GW Reports
Inspections
Other:

Landfarm
Liner
Methane
O & M
Run-on

308

TETRA TECH

RECEIVED

MAY 18 2009

Dept. of Enviro. Quality
Waste & Underground
Tank Management Bureau

Report of

# Post Closure Groundwater Monitoring Former Big Timber Landfill

## Big Timber, Montana

March 2009

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# March 2009
# Post Closure Groundwater Monitoring Former Big Timber Landfill

*Prepared for:*

**City of Big Timber**

*P.O. Box 416*
*Big Timber, Montana 59011*

*Prepared by:*

**Tetra Tech**

*618 South 25th Street*
*Billings, MT 59101*
*(406) 248-9161*
*Fax (406) 248-9282*
Tetra Tech Project No. 1159731053

May 11, 2009

# 308

TETRA TECH

May 11, 2009

Mr. Rick Gibby
City of Big Timber
P.O. Box 416
Big Timber, MT 59011

**SUBJECT: March 2009 Post Closure Groundwater Monitoring Results**
**Big Timber Sanitary Landfill, Big Timber, Montana**
**Tetra Tech Project No. 9731053.100**

Dear Mr. Gibby:

The attached report presents groundwater monitoring data collected by Tetra Tech on March 3, 2009 at the former Big Timber Landfill near Big Timber, Montana. The work was conducted in accordance with our *Proposal for Environmental Services* dated February 19, 2007 and the terms and conditions of the *Professional Services Agreement* between Tetra Tech and the City of Big Timber, dated February 19, 2007.

Concentrations of all parameters measured during this monitoring event were below regulatory enforcement standards as promulgated in the Administrative Rules of Montana [ARM 17.50.710(5)]. These results were similar to previous monitoring events. Statistical analysis of regulated inorganic constituents detected in groundwater samples determined that the chloride concentration and pH in well BT-7 were statistically significantly greater than concentrations in background wells. However, a statistical evaluation of the chloride and pH concentrations in well BT-7 indicate the chloride and pH concentrations are not increasing over time and are likely naturally occurring. All other parameters detected at the landfill site are statistically considered to be within the range of background concentrations.

If you have any questions regarding this report or any aspect of the project, please do not hesitate to call us. Following your review and approval we will forward a copy to the Montana Department of Environmental Quality on your behalf. We appreciate the opportunity to serve your environmental consulting needs.

RECEIVED
MAY 18 2009
Dept. of Enviro. Quality
Waste & Underground
Tank Management Bureau

Respectfully Submitted,

**Tetra Tech**

Jeffrey R. Rice
Environmental Group Manager

JRR/ba

N:\Typing\Env-fac\9731053\Post Closure March 2009\Former BT Landfill GWM Results

Enclosures

cc: Gayle McPhearson

Tetra Tech
P.O. Box 30615, Billings, MT 59107
618 South 25th Street, Billings, MT 59101
Tel 406.248.9161 Fax 406.248.9282 www.tetratech.com

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TETRA TECH

May 11, 2009

Mr. Rick Gibby
City of Big Timber
P.O. Box 416
Big Timber, MT 59011

**SUBJECT:** **March 2009 Post-Closure Groundwater Monitoring Results**
**Big Timber Landfill, Big Timber, Montana**
**Tetra Tech Project No. 9731053.100**

Dear Mr. Gibby:

The attached report presents groundwater monitoring data [illegible] on March 3, 2009 at the former Big Timber Landfill near Big Timber, Montana. The work was conducted in accordance with our *Proposal for Environmental Services* dated February [illegible], 2007 and the terms and conditions of the *Professional Services Agreement* between Tetra Tech and the City of Big Timber, dated February 19, 2007.

Concentrations of all parameters measured during the monitoring event were below regulatory enforcement standards as promulgated in the Administrative Rules of Montana (ARM 17.50.710(5)). These results [illegible] monitoring events. Statistical analysis of regulated inorganic constituents detected in groundwater samples determined that the chloride concentration and pH in well BT-7 were statistically significantly greater than concentrations in background wells. However, a statistical [illegible] in well BT-7 indicate the chloride and pH concentrations are not increasing over time and are likely naturally occurring. All other parameters detected at the landfill site are statistically considered to be within the range of background concentrations.

If you have any questions regarding this report or any aspect of the project, please do not hesitate to call us. Following your review and approval we will forward [illegible] Department of Environmental Quality on your behalf. We [illegible] your environmental consulting needs.

MAY 1 8 2009

Respectfully Submitted,

Tetra Tech

Jeffrey R. Rice
Environmental Group Manager

JRR/ba

Enclosures

cc: Gayle McPherson

# 1.0 INTRODUCTION

This report presents groundwater monitoring data collected by Tetra Tech at the Big Timber Sanitary Landfill (Figures 1 and 2) on March 3, 2009. Tetra Tech personnel completed groundwater monitoring activities at the landfill in accordance with the *Professional Services Agreement* between the City of Big Timber and Tetra Tech, dated February 19, 2007 and the *Proposal for Environmental Services* dated February 2007 (Tetra Tech, 2007a).

The Big Timber Sanitary landfill started receiving waste in 1992, stopped accepting waste in April 1997, and has completed implementation of its closure plan. This sampling event was conducted to partially fulfill the post-closure care requirements promulgated in the Administrative Rules of Montana Title 17, Chapter 50, Sub-Chapter 5 (ARM 17.50.531). Methods used to complete groundwater monitoring activities and results of this monitoring event are described in Sections 2.0 and 3.0 of this report, respectively.

# 2.0 METHODS

Field data collection activities and laboratory analyses were completed in accordance with procedures described in previous groundwater monitoring reports (Maxim, 2001) and shown on the Groundwater Sampling Logs presented in Appendix A. In accordance with previous groundwater monitoring events the following activities were conducted:

- Groundwater samples were collected from monitoring wells BT-1S, BT-2 and BT-7.
- Groundwater samples were not collected from monitoring wells BT-1D and BT-3 through BT-6.

Data validation methods and the statistical test methods are discussed further in Sections 4.0 and 5.0 of this report, respectively.

# 3.0 RESULTS

The following sections present data collected at the Big Timber Sanitary Landfill during this monitoring event. These data are also discussed and compared with data collected during previous monitoring events.

## 3.1 GROUNDWATER ELEVATIONS

A summary of all groundwater level data measured at the landfill since September 1989 is contained in Appendix A. A potentiometric surface contour map of groundwater elevations calculated from the data collected during this monitoring event is presented on Figure 3. Based on the groundwater potentiometric surface data, groundwater flows in a southwesterly direction under a gradient of approximately 0.019 feet per feet in the southwestern portion of the property, downgradient of the former waste cell and burn pit. The flow direction is similar to previous measurements.

Hydrographs were plotted for monitoring wells BT-1D, BT-1S, BT-2, BT-3, BT-4, BT-5, BT-6, and BT-7 using the water level data collected since October 1994 (Appendix B). These hydrographs indicate that seasonal fluctuations in the shallow water table under the landfill are generally not significant except in the southwest corner of the site where the groundwater elevation in well BT-6 fluctuates over five feet seasonally.

Hydraulic conductivities ranging from 0.31 feet per day (feet/day) to 0.85 feet/day were calculated using data from single well aquifer tests conducted at the site (Chen-Northern, Inc., 1990). The effective porosity of the water-bearing sandstone, siltstone, and mudstone at the site is estimated to be 20 percent (Chen-Northern, Inc., 1990). Based on the measured gradients, the groundwater velocity calculated using Darcy's Law (Freeze and Cherry, 1979) is expected to range from 0.026 to 1.14 feet/day at the site (e.g. Tetra Tech, 2007b). The transport distance from the former waste cell to downgradient wells BT-6 and BT-7 is approximately 300 feet. Using the range of linear flow velocities, the travel time to reach the downgradient wells (BT-6 and BT-7) would range from approximately three to eight years.

The landfill cell is located between wells BT-2 and BT-7 as shown on Figure 3. This cell was excavated in the unconsolidated silty clay and weathered shale to an approximate depth of 20 feet. Based on previously collected data the base of the landfill cell is approximately 10 feet above the April 27, 2001 potentiometric surface (Maxim Technologies, Inc., 2001). Historical groundwater level data collected at the Big Timber Landfill (Appendix B), indicates the May 2007 potentiometric surface represents the near low groundwater elevation. Seasonal groundwater fluctuations at the site are approximately five to six feet at the furthest southwest corner of the property. During periods of high groundwater elevations the base of the landfill cell would be approximately four to five feet above the groundwater potentiometric surface (Maxim Technologies, Inc., 2001).

## 3.2 GROUNDWATER QUALITY

Groundwater samples were collected from monitoring wells BT-1S, BT-2, and BT-7 on March 3, 2009. A sample could not be collected from monitoring well BT-6 as the well was dry following removal of two gallons (Appendix A). This was the second consecutive event well BT-6 contained insufficient water to sample. Copies of groundwater sampling logs from this monitoring event are contained in Appendix A. The laboratory results from this monitoring event are summarized in Table 1. Laboratory analytical results and chain-of-custody forms for groundwater samples collected at the landfill during this sampling event are presented in Appendix C. A summary of all laboratory analytical data collected to date is presented in Appendix D.

### *3.2.1 Inorganic Water Quality*

Of the inorganic parameters analyzed, electrical conductivity (EC), chloride, sulfate, chemical oxygen demand (COD), nitrate plus nitrite as nitrogen, barium, chromium, copper, iron, selenium and silver were detected with concentrations above their respective laboratory practical quantitation limits (PQLs) during this monitoring event. However, all detected parameter concentrations were below groundwater protection standards as promulgated in ARM 17.50.710(5) and were similar to previously detected concentrations. Discussion on the statistical validity of these results is presented in Sections 4.0 and 5.0. Concentrations of inorganic constituents in downgradient well BT-7 do not appear indicative of any landfill leachate migration.

### *3.2.2 Organic Water Quality*

Concentrations of volatile organic compounds (VOCs) were below their respective PQLs in all water samples collected at the landfill during this monitoring event. No VOC groundwater protection standard has ever been exceeded in any groundwater sample collected at the former Big Timber Landfill site.

## TABLE 1
## GROUNDWATER ANALYTICAL RESULTS
## BIG TIMBER SANITARY LANDFILL
## MARCH 3, 2009

| PARAMETER | UNITS | MDEQ REGULATORY CONC.[1] | BT-1S | BT-101 [2] | BT-2 | BT-7 |
|---|---|---|---|---|---|---|
| Temperature | °C | NA | 15.7 | 15.7 | 15.9 | 15.6 |
| Electrical Conductivity | µmhos/cm | NA | 1350 | 1310 | 524 | 1250 |
| Chloride | mg/l | NA | 100 | 99.5 | 32.0 | 182 |
| Sulfate | mg/l | NA | 336 | 331 | 145 | 232 |
| Chemical Oxygen Demand | mg/l | NA | 6.2J | <5.0 | <5.0 | <5.0 |
| Cyanide | mg/l | 0.2 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| pH | s.u. | NA | 7.9 | 7.9 | 8.3 | 7.7 |
| Nitrate+Nitrite as N | mg/l | 10 | 4.4 | 4.3 | 0.020 | 0.070 |
| Antimony | µg/l | 6.0 | 0.062J | 0.091J | <0.05 | <0.050 |
| Arsenic | µg/l | 50 | <0.25 | <0.25 | <0.51 | <0.25 |
| Barium | µg/l | 2,000 | 24 | 25 | 17 | 26 |
| Beryllium | µg/l | 4 | 0.18J | 0.11J | <0.10 | <0.10 |
| Cadmium | µg/l | 5 | 1.0 | 1.0 | <0.040 | 0.089 |
| Chromium | µg/l | 100 | 1.7 | 1.7 | <0.25 | <0.25 |
| Cobalt | µg/l | NA | <0.25 | <0.25 | <0.25 | <0.25 |
| Copper | µg/l | 1,300 | 1.3 | 1.3 | 0.25J | 0.34J |
| Iron | µg/l | NA | <25 | <25 | <25 | <25 |
| Lead | µg/l | 15 | <0.050 | <0.050 | <0.050 | <0.050 |
| Mercury | µg/l | 2 | 0.00835 | 0.00718 | 0.0108 | 0.0117 |
| Nickel | µg/l | 100 | 1.2 | 1.6 | <0.74 | 0.37J |
| Selenium | µg/l | 50 | 8.8 | 8.9 | <0.25 | <0.25 |
| Silver | µg/l | 100 | <0.25 | <0.25 | <0.25 | <0.25 |
| Thallium | µg/l | 2 | <0.25 | <0.25 | <0.25 | <0.25 |
| Vanadium | µg/l | NA | 1.6 | 1.7 | 0.40 | 0.60 |
| Zinc | µg/l | 2,000 | 4.2J | 3.6J | <2.5 | <2.5 |
| VOCs[3] | µg/l | ND | ND | ND | ND | ND |

[1] Regulatory Concentration = Regulatory concentration as defined by Maximum Contaminant Level (MCL), Title 40 Code of Federal Regulations, Part 141 (US EPA, 2008) or Montana Human Health Standard (HHS) if a MCL has not been promulgated (MDEQ, 2008).

[2] Duplicate of well BT-1S

[3] VOCs – Volatile organic compounds analyzed by EPA Method 8260, see laboratory report in Appendix C for reporting limits

s.u. = standard units
mg/l = milligrams per liter
ND = not detected at laboratory reporting limit
µg/l = micrograms per liter
°C = degrees Centigrade
µmhos/cm = micromhos per centimeter
NA = Not applicable
J = Estimated value

# 4.0 DATA VALIDATION

This section describes the data validation process used to determine the adequacy and quality of laboratory analytical data collected at the Big Timber Landfill. The objective of data validation is to identify any unreliable or invalid laboratory measurements and qualify that data for interpretive use. These validations are performed according to guidelines prepared by US EPA Contract Laboratory Program NationalFunctional Guidelines (1999, 2002).

## 4.1 FIELD QUALITY ASSURANCE/QUALITY CONTROL

A field duplicate sample was collected from well BT-1S and labeled as BT-101. This sample was delivered to the laboratory on March 3, 2009. The field duplicate sample from well BT-1S was analyzed for all parameters listed in Table 1 of ARM 17.50.708 plus dichlorodifluoromethane.

Analytical results for the original and field duplicate samples, BT-1S and BT-101 were evaluated using the following criteria:

1) The relative percent difference (RPD) between the two samples was calculated when both values of the natural/duplicate pair were greater than five times the PQL for a given analyte,

2) The absolute value difference between the natural and replicate sample for a given analyte was calculated when one or both values were less than five times the PQL.

RPDs are calculated by dividing the difference between the two reported values for a given parameter by the average of the two parameters. Analytical results of parameters where the RPD was greater than 20 percent are considered estimated concentrations. In the March 2009 sampling event, no parameters exhibited an RPD in excess of 20 percent.

Results from natural/replicate pairs with values less than five times the PQL are considered estimated when the absolute value difference (AVD) exceeds the PQL. In the March 2009 sampling event, no parameters exhibited an AVD exceeding the PQL.

Analytical results for the trip blank were evaluated using the following criteria:

1) Blank analytical results are reviewed to determine if any parameter was measured at detectable concentrations.

2) All results greater than the PQL but less than five times the concentration of the blank are considered estimated and are likely biased toward the high end.

3) Common laboratory contaminants (methylene chloride, acetone, and 2-butanone) are considered estimated when results are greater than the PQL but less than 10 times the concentration of the contaminated blank.

The trip blank was submitted to the laboratory on March 3, 2009 along with the natural samples. Methylene chloride was detected in the trip blank at an estimated concentration of 2.1 μg/l (micrograms per liter), which is just above the 2.0 μg/l detection limit for methylene chloride. Methylene chloride was not detected in any natural samples, and therefore these results do not affect the quality of the data presented in this report.

## 4.2 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

The quality assurance coordinator at Pace Analytical Services, Inc. (Pace) reviewed all analytical data associated with these samples. This review included calibration standards, calibration verification standards, blanks, laboratory controls, laboratory duplicates, and laboratory spikes. A summary of quality control (QC) data is presented in Appendix E.

The Pace Billings, Montana laboratory received groundwater samples from the Big Timber Landfill on March 3, 2009. Chain-of-custody documents accompanied the samples from sample collection to receipt at the laboratory. The samples were received at the correct temperature of 4.0 °C. The samples were repackaged and shipped to Pace Analytical Services in Minneapolis, Minnesota. The samples were received at the Minneapolis laboratory at a temperature of 2.4 °C. The pH of the acid-preserved samples was checked and all samples were found to be properly preserved.

Volatile organic compound (VOC) analysis was conducted at the Pace Minneapolis laboratory using EPA Method 8260 on March 6, 2009. The analysis met the method and laboratory quality requirements except for the batch matrix spike and matrix spike duplicate (MS/MSD). The MS/MSD was performed on a non-project sample. The recovery of vinyl acetate was above the recovery limits at 412% and 389%. The relative percent difference (RPD) between the MS and MSD for carbon disulfide of 34% was greater than the maximum RPD of 30%. The Big Timber landfill samples did not require qualification due to the MS/MSD recoveries or RPDs.

Metals analysis was conducted using EPA Method 6020, also at the Pace Minneapolis laboratory. The analysis met the method and laboratory quality requirements except for the continuing calibration verification (CCV) standard recovery for silver. The recovery of silver in the CCV was above the recovery limits. However silver was not detected in any of the Big Timber Landfill samples so were not affected by the high system bias.

Mercury analysis was performed by the Pace Green Bay laboratory using EPA Method 1631E. The analysis met the method and laboratory quality requirements.

The samples were analyzed by the Pace Billings laboratory for specific conductance, chloride, sulfate, nitrate + nitrite and pH. The chemical oxygen demand and cyanide analysis was performed by the Pace Minneapolis laboratory. The analyses met the method and laboratory quality criteria except as follows. The cyanide distillation was performed within the fourteen day holding time, however, the analysis of the distilled samples was performed outside of the fourteen day holding period. The MS/MSD analysis performed on sample BT-1S had acceptable MS recovery at 94% however the MSD recovery was below the 80-120% recovery limits at 73%. Consequently, the cyanide results may be biased low.

# 5.0 STATISTICAL QUALITY ASSURANCE/QUALITY CONTROL ANALYSIS

## 5.1 STATISTICAL TEST METHODS

Data in this statistical evaluation have small sample sizes and exhibit non-normal distributions for which non-parametric statistical techniques are appropriate (US EPA, 1989 and 1992). Multiple comparison procedures, testing the difference between each downgradient well (BT-6 and BT-7) and upgradient well group (BT-1S, BT-2, BT-3, BT-4 and BT-5) are performed at the 99 percent confidence

level. If there is a statistically significant difference, then there is evidence that the downgradient well exceeds background concentrations.

When the percentage of non-detects in the data set are less than or equal to 50 percent, the Mann-Whitney test is used as non-parametric method for the comparison of median concentrations. Use of this test is recommended where data are not normally distributed and these tests tend to be more powerful than parametric tests for detecting differences in small data sets. Sample sizes of four or more observations for each well are recommended (US EPA, 1992). Individual well comparisons are one-sided, testing the alternative that the concentration in the downgradient well is greater than the background well. In each test, data are ranked prior to median calculation and the tests are performed on the ranks. Resulting p-values are used to test the significance of differences. A p-value less than or equal to 0.01 indicates a statistically significant difference in medians at the 99 percent confidence level (individual well comparisons).

If more than 50 percent of the data set are below detection, but more than 10 percent of the observations are quantified, the test of proportions, also know as contingency table analysis, is used as a test of the proportion of non-detects in each well. Use of this technique is recommended by the US EPA (1989 and 1992) and is endorsed by Helsel and Hirsch (1992) as an alternative in heavily censored data. Individual well comparisons are one-sided, testing the alternative that proportion of detects in the downgradient well is greater than background. A chi-square statistic is calculated by comparing the observed counts with the expected counts when the null hypothesis is true. This statistic is compared to the 99th (individual well comparisons) quantiles of the chi-square distribution. If the calculated statistic is greater than the tabulated chi-square test statistic, this indicates a statistically significant difference at the 99 percent confidence level.

When 90 percent or more of the data are non-detects, US EPA (1989 and 1992) and Gibbons (1994) recommend the use of the Poisson prediction interval method to test whether a rare observation represents a significant increase over background levels. For comparison purposes, an upper limit is calculated from background data. To test the upper prediction limit, the sum of the Poisson counts of the independent observations made in the comparison wells are calculated. The 99 percent confidence level is used for individual well comparisons. If this sum is greater than the upper prediction limit, there is evidence of significant increase over background levels. It should be noted that since power functions are used in calculating the upper limit, all calculations are performed using units of micrograms per liter.

Analytical data reported for these wells have multiple detection limits (multiple PQLs) for any one parameter over the time period represented by the data. These data have been censored following US EPA guidance (US EPA, 1989 and 1992) and using techniques appropriate to the statistical method. For the Mann-Whitney tests, an attempt is made to censor non-detect values at the highest detection limit as recommended by Helsel and Hirsh (1992). In instances where the highest detection limit is extreme or masks a large proportion of the data, the observations associated with the extreme values are discarded and the remaining non-detects are censored at the next highest limit. Non-detect data are then further censored to distinguish between data detected at the practical quantitation limit (PQL) and data between the method detection limit (MDL) and PQL. Data evaluated by contingency tables are not censored since this is simply a test of proportions (Helsel and Hirsch 1992). For calculating Poisson prediction intervals, non-detect data are replaced by one half the practical quantitation limit associated with the observation (US EPA, 1992).

## 5.2 STATISTICAL TEST RESULTS

Of those parameters listed in Table 1 of ARM 17.50.708, the following parameters exhibited detectable concentrations at or above the PQL on at least one occasion over the period of record in samples collected from downgradient monitoring wells BT-6 and BT-7: antimony, arsenic, barium, cadmium,

chloride, cobalt, chemical oxygen demand (COD), chromium, copper, iron, nickel, pH, specific conductance, selenium, silver, sulfate ($SO_4$) and zinc. For the downgradient wells exhibiting detectable concentrations of these parameters, water quality data over the period of record were statistically evaluated to determine which showed a statistically significant increase when compared to the background wells. Data used in the statistical evaluation of these parameters are listed in Appendix F.

Downgradient well BT-6 was dry in the May 2007 and March 2009 sampling events; therefore statistics were not performed on well BT-6. Additionally, since arsenic, cobalt, nickel and antimony have only been detected in well BT-6 and have never been detected in well BT-7, they were not considered for statistical analysis for this event.

Results of statistical analyses are summarized in Table 2 and output from statistical analyses including descriptive statistics, data plots, and test results are presented in Appendix F. Thirteen tests were performed at the 99 percent confidence level. This represents a site-wide false positive rate of about 12 percent. The site wide false positive rate indicates the probability that the statistical evaluation will yield a positive result when, in fact, it is not. In this reporting period, there is almost a 1 in 8 probability of one or more false positives due to chance.

Of the thirteen parameters tested, chloride and pH in BT-7 exhibited concentrations that were statistically significantly greater than background levels. The null hypothesis, that concentrations were not significantly greater, was accepted for all other parameters. Except for pH, all statistical evaluations were one-sided, testing the alternative hypothesis that concentrations were greater than background.

## TABLE 2
## SUMMARY OF STATISTICAL COMPARISONS TO BACKGROUND
## BIG TIMBER SANITARY LANDFILL
## SWEETGRASS COUNTY, MONTANA

| Parameter | Statistical Tests(1) | Sample Sizes(2) | Mann-Whitney Wells / P-Values(3) BT-7 | Contingency Table Wells / P-Values(4) BT-7 | Poisson Prediction Limit(5) BT-7 | Statistically Significant Exceedance |
|---|---|---|---|---|---|---|
| Arsenic | PPI | - | - | - | - | - |
| Silver | PPI | 31/12 | - | - | 7.82 | None |
| Barium | CT | 31/12 | - | 0.28 | - | None |
| Cadmium | PPI | 31/12 | - | - | 7.82 | None |
| Chloride | MW | 31/121 | 0.00 | - | - | BT-7 |
| Cobalt | PPI | - | - | - | - | - |
| COD | MW | 31/12 | 0.06 | - | - | None |
| Chromium | CT | 31/12 | - | 0.95 | - | None |
| Copper | CT | 31/12 | - | (6) | - | None |
| Iron | CT | 31/12 | - | 0.30 | - | None |
| Nickel | PPI | - | - | - | - | - |
| pH | MW | 31/12 | 0.00 | - | - | BT-7 |
| Antimony | CT | - | - | - | - | - |
| SC | MW | 31/12 | 0.26 | - | - | None |
| Selenium | CT | 31/12 | - | (6) | - | None |
| Sulfate | MW | 31/12 | 0.42 | - | - | None |
| Zinc | CT | 31/12 | - | - | (6) | None |
| | | | | | | |

Notes:

1) MW - Mann-Whitney Rank Sum; CT - Contingency Table; PPI - Poisson Prediction Interval;
2) Parameter sample sizes for each well included in statistical evaluation: Upgradient group of BT-1s,2,3,4,5 / BT-6/BT-7.
3) The p-value is the probability of obtaining the calculated test statistic given that the null hypothesis is true.
4) The p-value is the probability of obtaining the calculated test statistic given that the null hypothesis is true; It is determined by comparing the chi-square statistic to the chi-square distribution with 1 degree of freedom (individual comparisons).
5) The Poisson prediction limits report the upper prediction limit based on background observations.
6) The comparison of one or more downgradient wells to upgradient well group was not meaningful since the median value or proportion of detects to non-detects for the upgradient well group was greater than (or less than in the case of pH) the downgradient well(s).

# 6.0 CONCLUSIONS AND RECOMMENDATIONS

This report includes statistical analysis and hydrological review of historical data at the Big Timber Landfill for the purposes of establishing recommendations for future work at the facility. The results of this report identify the following:

- Groundwater flow under the former Big Timber Landfill was to the southwest at a gradient of approximately 0.019 feet per feet.
- No VOC concentrations were detected in the groundwater samples collected during the March 2009 groundwater monitoring event. The organics analyses have not detected any VOCs during the history of monitoring at the site.
- No inorganic parameter concentration exceeded any US EPA drinking water maximum contaminant level or the MDEQ human health standard. The concentrations of inorganic constituents in downgradient well BT-7 do not appear indicative of any landfill leachate migration.
- Statistical analysis of regulated inorganic constituents detected in groundwater samples collected at the Big Timber Landfill concluded that there was not a statistically significant difference in downgradient well BT-7 compared to upgradient wells except for chloride and pH. The chloride concentration and pH in well BT-7 was statistically significantly greater than concentrations in the background wells. The statistically significant increase in chloride concentration in well BT-7 relative to chloride concentrations in upgradient monitoring wells may be due to the naturally occurring higher concentrations of chloride in geologic sediments surrounding well BT-7. Downgradient well BT-6 was dry and consequently, was not sampled.
- Based on the data presented above it does not appear the former Big Timber Landfill has impacted groundwater quality at the site.

# 7.0 LIMITATIONS

This work was performed in accordance with the generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Tetra Tech observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Tetra Tech's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of the monitoring. Other than this, no warranty is implied or intended.

Prepared by:

for
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Staff Scientist

Reviewed by:

Paul E. Lemire
Project Scientist

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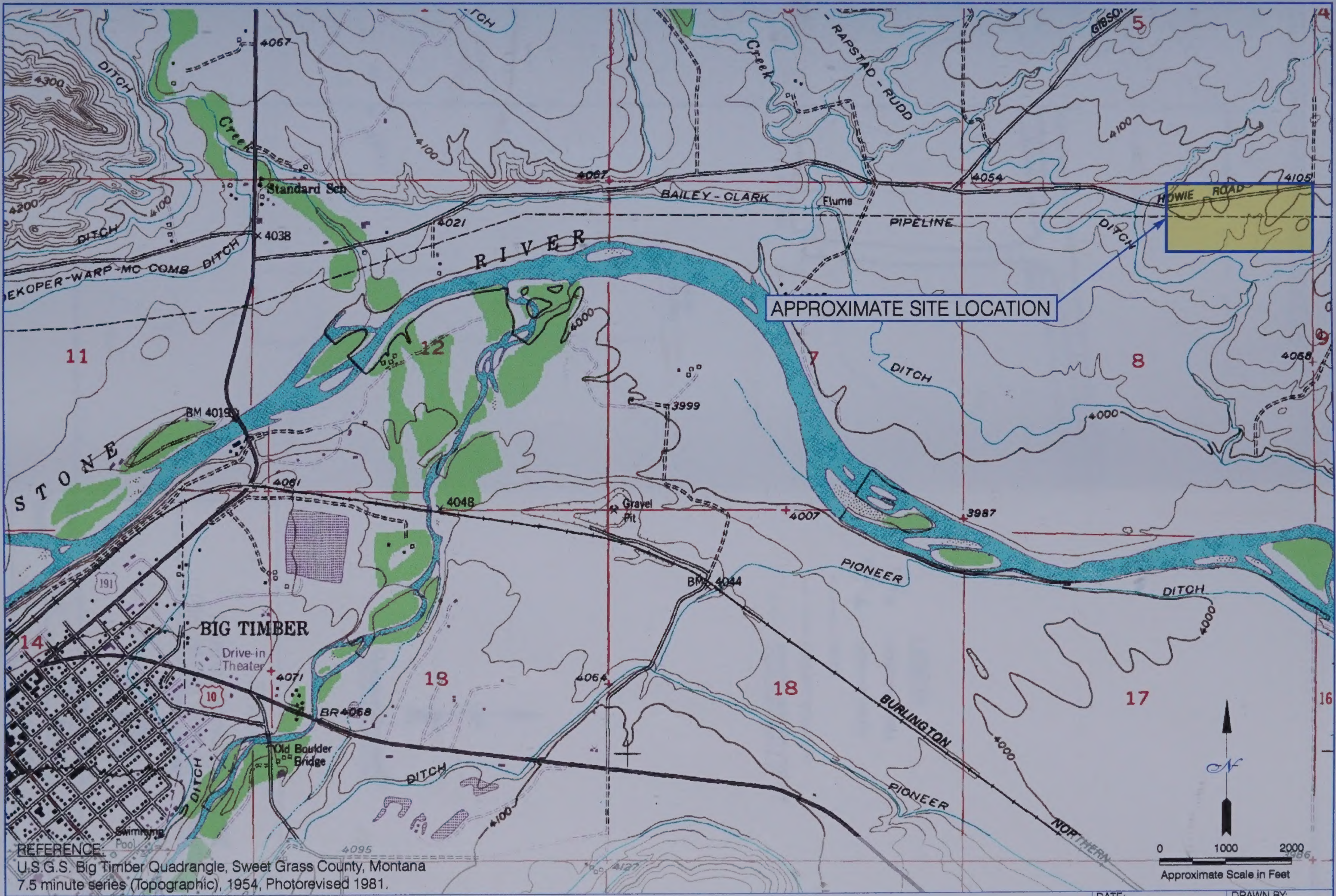
# Figures

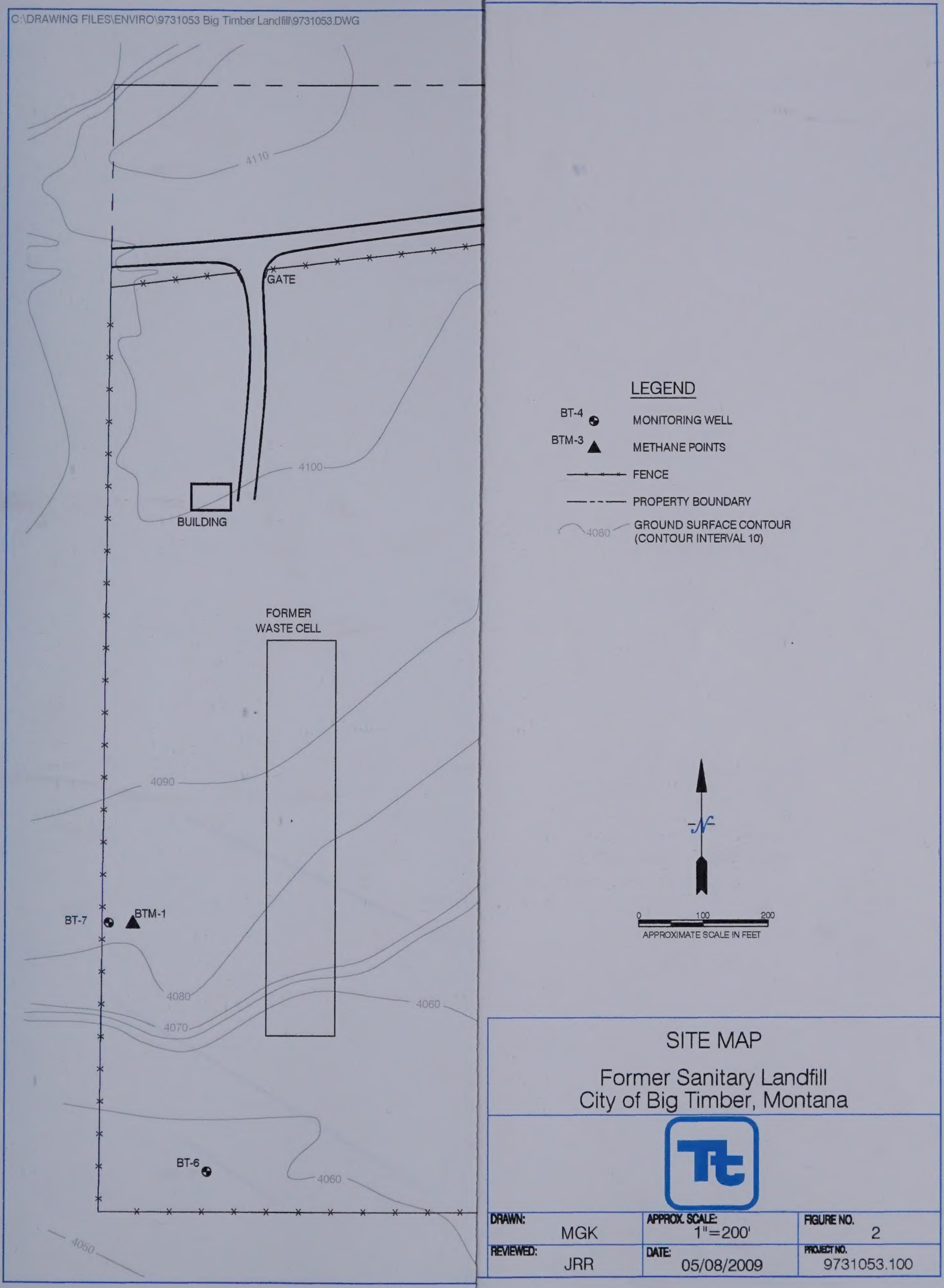

APPROXIMATE SITE LOCATION
HOWIE ROAD
BAILEY - CLARK
PIPELINE
DITCH
Flume
RIVER
STONE
BIG TIMBER
Standard Sch
Creek
RAPSTAD - RUDD
GIBSON
DEKOPER-WARP-MC COMB DITCH
Drive-in Theater
Old Boulder Bridge
Gravel Pit
Swimming Pool
PIONEER
DITCH
BURLINGTON
NORTHERN
4067
4300
4200
4100
4021
4038
4054
4105
4000
3999
4061
4048
4007
3987
4044
4068
4071
4064
4095
4127
BM 4019
BM 4044
BR 4068
5
4
7
8
9
11
12
13
14
16
17
18
191
10
N
0
1000
2000
Approximate Scale in Feet

REFERENCE:
U.S.G.S. Big Timber Quadrangle, Sweet Grass County, Montana
7.5 minute series (Topographic), 1954, Photorevised 1981.

# SITE LOCATION MAP

Former City of Big Timber Sanitary Landfill
Sweet Grass County, Montana

| | |
|---|---|
| DATE: 03/27/2009 | DRAWN BY: MGK |
| REVIEWED: JRR | APPROX. SCALE: 1"=2000' |
| PROJ. NO.: 9731053.100 | FIGURE NO.: 1 |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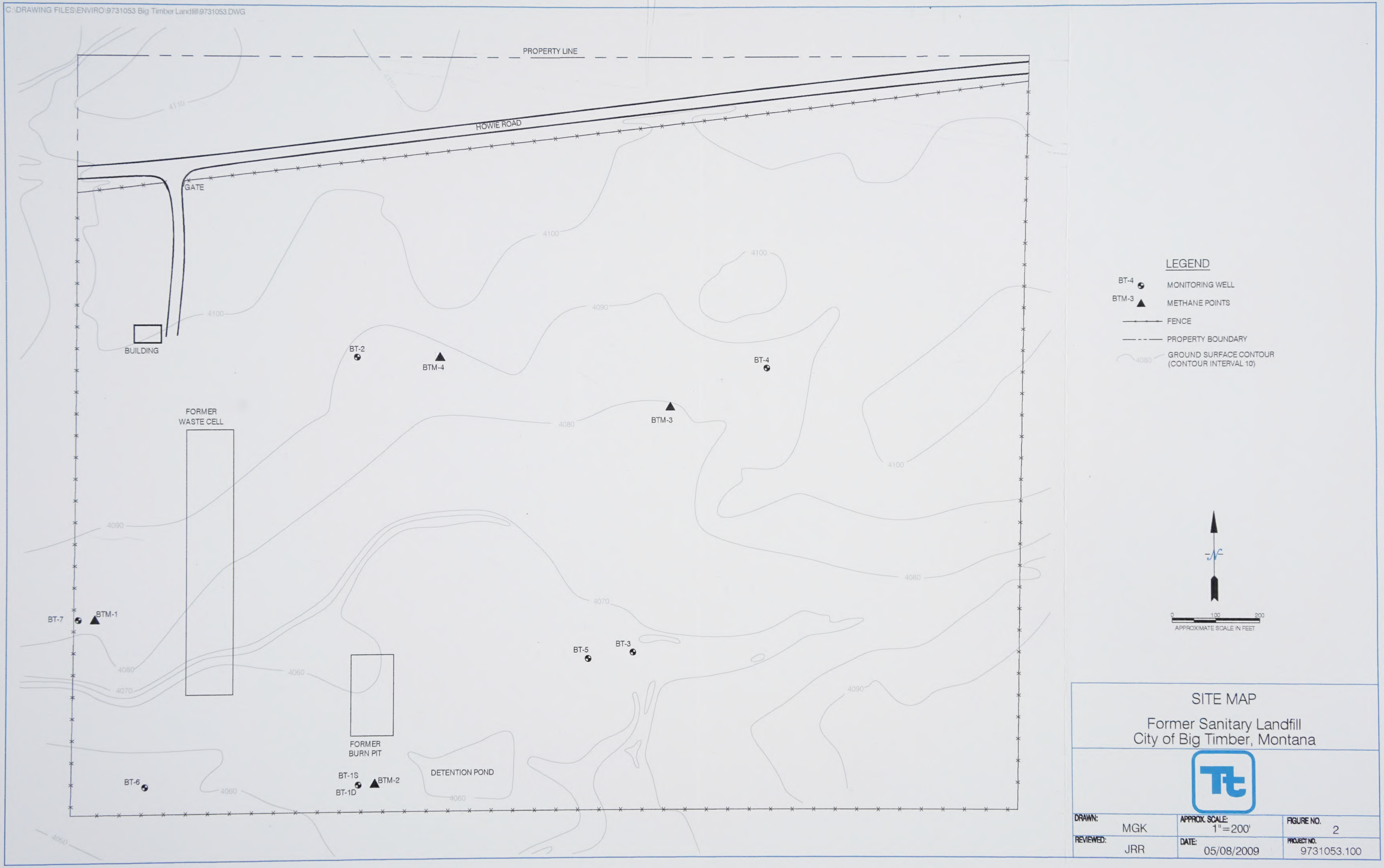
4110
GATE
4100
BUILDING
FORMER
WASTE CELL
4090
BT-7
BTM-1
4080
4070
4060
BT-6
4060
4050
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10')
N
0
100
200
APPROXIMATE SCALE IN FEET

# SITE MAP

## Former Sanitary Landfill
## City of Big Timber, Montana

| | | |
|---|---|---|
| **DRAWN:** MGK | **APPROX. SCALE:** 1"=200' | **FIGURE NO.** 2 |
| **REVIEWED:** JRR | **DATE:** 05/08/2009 | **PROJECT NO.** 9731053.100 |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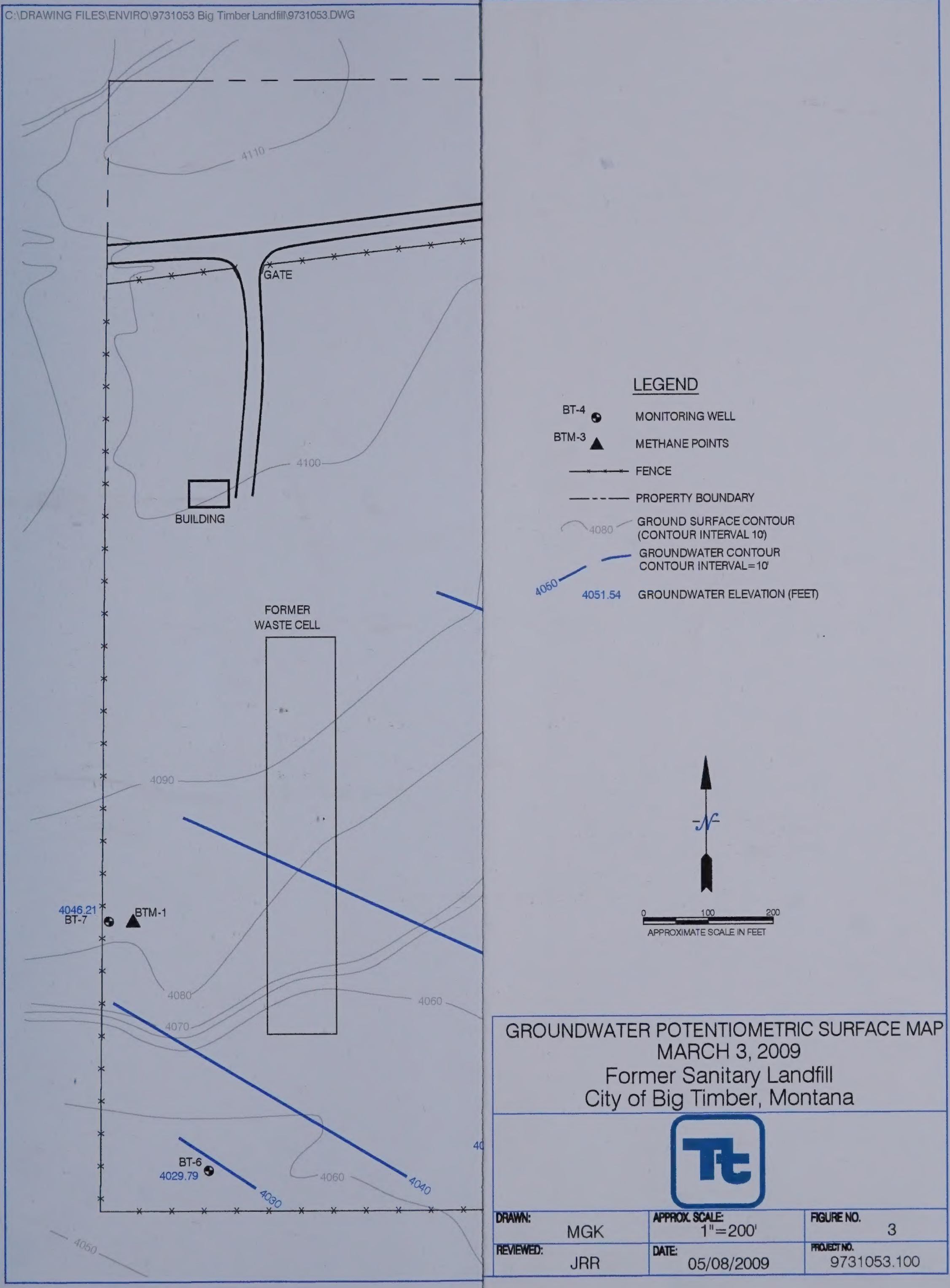
PROPERTY LINE
HOWIE ROAD
GATE
BUILDING
FORMER
WASTE CELL
FORMER
BURN PIT
DETENTION POND
BT-2
BTM-4
BT-4
BTM-3
BT-7
BTM-1
BT-5
BT-3
BT-6
BT-1S
BT-1D
BTM-2
4110
4100
4090
4080
4070
4060
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURFACE CONTOUR
(CONTOUR INTERVAL 10)
N
0
100
200
APPROXIMATE SCALE IN FEET

## SITE MAP

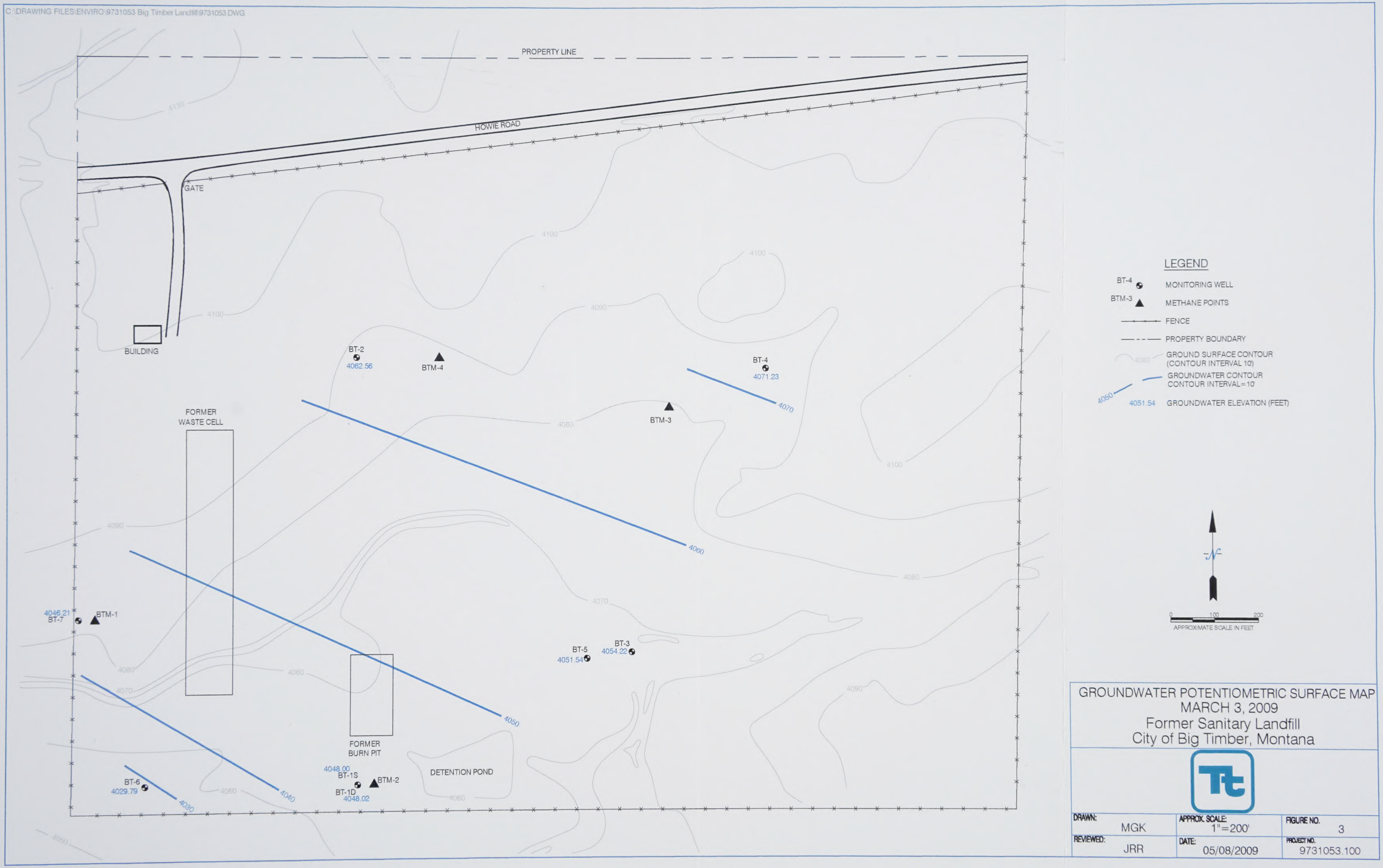
Former Sanitary Landfill
City of Big Timber, Montana

| | | |
|---|---|---|
| DRAWN: MGK | APPROX. SCALE: 1"=200' | FIGURE NO. 2 |
| REVIEWED: JRR | DATE: 05/08/2009 | PROJECT NO. 9731053.100 |


C:\DRAWING FILES\ENVIRO\9731053 Big Timber Landfill\9731053.DWG
4110
GATE
4100
BUILDING
FORMER
WASTE CELL
4090
4046.21
BT-7
BTM-1
4080
4070
4060
4060
BT-6
4029.79
4030
4040
4050
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10')
GROUNDWATER CONTOUR CONTOUR INTERVAL=10'
4050
4051.54 GROUNDWATER ELEVATION (FEET)
N
0 100 200
APPROXIMATE SCALE IN FEET

GROUNDWATER POTENTIOMETRIC SURFACE MAP
MARCH 3, 2009
Former Sanitary Landfill
City of Big Timber, Montana

| | | |
|---|---|---|
| DRAWN: MGK | APPROX. SCALE: 1"=200' | FIGURE NO. 3 |
| REVIEWED: JRR | DATE: 05/08/2009 | PROJECT NO. 9731053.100 |


C:\DRAWING FILES\ENVIRO\9731053 Big Timber Landfill\9731053.DWG
PROPERTY LINE
HOWIE ROAD
GATE
BUILDING
FORMER WASTE CELL
FORMER BURN PIT
DETENTION POND
BT-2
4062.56
BTM-4
BT-4
4071.23
BTM-3
BT-5
4051.54
BT-3
4054.22
4046.21
BT-7
BTM-1
BT-6
4029.79
4048.00
BT-1S
BT-1D
4048.02
BTM-2
4070
4060
4050
4040
4030
4110
4100
4090
4080
4070
4060
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4060 GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10')
GROUNDWATER CONTOUR CONTOUR INTERVAL=10'
4050
4051.54 GROUNDWATER ELEVATION (FEET)
N
0
100
200
APPROXIMATE SCALE IN FEET

GROUNDWATER POTENTIOMETRIC SURFACE MAP
MARCH 3, 2009
Former Sanitary Landfill
City of Big Timber, Montana

| | | |
|---|---|---|
| DRAWN: MGK | APPROX. SCALE: 1"=200' | FIGURE NO. 3 |
| REVIEWED: JRR | DATE: 05/08/2009 | PROJECT NO. 9731053.100 |

# Appendix A

# Groundwater Elevation Data

# FORMER BIG TIMBER LANDFILL

## Groundwater Elevation Data

Tetra Tech Project No. 9731053

**WELL NO. BT-1S**
**REFERENCE ELEVATION: 4067.78**
**REFERENCE POINT TOP OF RISER PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (AMSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.42 | 4049.36 | | |
| 07/19/90 | 19.08 | 4048.70 | -0.66 | |
| 10/04/94 | 17.06 | 4050.72 | 2.02 | |
| 01/30/95 | 17.92 | 4049.86 | -0.86 | |
| 02/27/95 | 14.87 | 4052.91 | 3.05 | |
| 03/27/95 | 15.13 | 4052.65 | -0.26 | |
| 04/28/95 | 15.98 | 4051.80 | -0.85 | |
| 05/26/95 | 15.17 | 4052.61 | 0.81 | |
| 06/30/95 | 15.50 | 4052.28 | -0.33 | |
| 07/31/95 | 15.92 | 4051.86 | -0.42 | |
| 08/22/95 | 16.25 | 4051.53 | -0.33 | |
| 09/30/95 | 16.83 | 4050.95 | -0.58 | |
| 10/31/95 | 17.33 | 4050.45 | -0.50 | |
| 11/28/95 | 17.33 | 4050.45 | 0.00 | |
| 12/26/95 | 17.50 | 4050.17 | -0.28 | Well re-surveyed new reference elev.= 4067.67 |
| 01/16/96 | 17.51 | 4050.16 | -0.01 | |
| 10/08/96 | 16.67 | 4051.00 | 0.84 | |
| 04/29/97 | 16.00 | 4051.67 | 0.67 | |
| 12/10/97 | 15.71 | 4051.96 | 0.29 | |
| 11/19/98 | 17.64 | 4050.03 | -1.93 | |
| 05/06/99 | 18.15 | 4049.52 | -0.51 | |
| 10/20/99 | 19.54 | 4048.13 | -1.39 | |
| 04/25/00 | 20.47 | 4047.20 | -0.93 | |
| 10/18/00 | 20.96 | 4046.71 | -0.49 | |
| 04/07/01 | 20.41 | 4047.26 | 0.55 | |
| 05/11/07 | 19.93 | 4047.74 | 0.48 | |
| 03/03/09 | 19.67 | 4048.00 | 0.26 | |

**WELL NO. BT-1D**
**REFERENCE ELEVATION: 4067.78**
**REFERENCE POINT TOP OF RISER PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.36 | 4049.42 | | |
| 07/19/90 | 19.23 | 4048.55 | -0.87 | |
| 10/04/94 | 17.30 | 4050.48 | 1.93 | |
| 01/30/95 | 17.83 | 4049.95 | -0.53 | |
| 02/27/95 | 15.37 | 4052.41 | 2.46 | |
| 03/27/95 | 15.29 | 4052.49 | 0.08 | |
| 04/28/95 | 17.60 | 4050.18 | -2.31 | |
| 05/26/95 | 17.50 | 4050.28 | 0.10 | |
| 06/30/95 | 17.08 | 4050.70 | 0.42 | |
| 07/31/95 | 16.66 | 4051.12 | 0.42 | |
| 08/22/95 | 17.16 | 4050.62 | -0.50 | |
| 09/30/95 | 17.25 | 4050.53 | -0.09 | |
| 10/31/95 | 17.92 | 4049.86 | -0.67 | |
| 11/28/95 | 17.33 | 4050.45 | 0.59 | |
| 12/26/95 | 17.58 | 4049.85 | -0.60 | Well re-surveyed new reference elev.= 4067.43 |
| 01/16/96 | 17.38 | 4050.05 | 0.20 | |
| 10/08/96 | 16.58 | 4050.85 | 0.80 | |
| 04/29/97 | NM | | NM | |
| 12/10/97 | 15.85 | 4051.58 | 0.73 | |
| 11/19/98 | 18.07 | 4049.36 | -2.22 | |
| 05/06/99 | 18.85 | 4048.58 | -0.78 | |
| 10/20/99 | 19.28 | 4048.15 | -0.43 | |
| 04/25/00 | 19.75 | 4047.68 | -0.47 | |
| 10/18/00 | 19.77 | 4047.66 | -0.02 | |
| 04/07/01 | 21.92 | 4045.51 | -2.15 | |
| 05/11/07 | NM | | | |
| 03/03/09 | 19.41 | 4048.02 | | |

# FORMER BIG TIMBER LANDFILL

## Groundwater Elevation Data

Tetra Tech Project No. 9731053

**WELL NO. BT-2**

**REFERENCE ELEVATION: 4090.55**

**REFERENCE POINT TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 23.64 | 4066.91 | | |
| 07/19/90 | 27.29 | 4063.26 | -3.65 | |
| 10/04/94 | 26.34 | 4064.21 | 0.95 | |
| 01/30/95 | 23.71 | 4066.84 | 2.63 | |
| 02/27/95 | 23.50 | 4067.05 | 0.21 | |
| 03/27/95 | 23.33 | 4067.22 | 0.17 | |
| 04/28/95 | 25.03 | 4065.52 | -1.70 | |
| 05/26/95 | 24.42 | 4066.13 | 0.61 | |
| 06/30/95 | 24.50 | 4066.05 | -0.08 | |
| 07/31/95 | 25.00 | 4065.55 | -0.50 | |
| 08/22/95 | 25.00 | 4065.55 | 0.00 | |
| 09/30/95 | 25.16 | 4065.39 | -0.16 | |
| 10/31/95 | 25.42 | 4065.13 | -0.26 | |
| 11/28/95 | 25.58 | 4064.97 | -0.16 | |
| 12/26/95 | 25.83 | 4064.52 | -0.45 | Well re-surveyed new reference elev.= 4090.35 |
| 01/16/96 | 25.61 | 4064.74 | 0.22 | |
| 10/08/96 | 25.40 | 4064.95 | 0.21 | |
| 04/29/97 | 25.34 | 4065.01 | 0.06 | |
| 12/10/97 | 25.46 | 4064.89 | -0.12 | |
| 11/19/98 | 26.58 | 4063.77 | -1.12 | |
| 05/06/99 | 27.02 | 4063.33 | -0.44 | |
| 10/20/99 | 27.37 | 4062.98 | -0.35 | |
| 04/25/00 | 27.78 | 4062.57 | -0.41 | |
| 10/18/00 | 27.96 | 4062.39 | -0.18 | |
| 04/07/01 | 28.25 | 4062.10 | -0.29 | |
| 05/11/07 | 28.49 | 4061.86 | -0.24 | |
| 03/03/09 | 27.79 | 4062.56 | 0.70 | |

**WELL NO. BT-3**

**REFERENCE ELEVATION: 4069.31**

**REFERENCE POINT TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 14.67 | 4054.64 | | |
| 07/19/90 | 15.70 | 4053.61 | -1.03 | |
| 10/04/94 | 13.68 | 4055.63 | 2.02 | |
| 01/30/95 | 12.66 | 4056.65 | 1.02 | |
| 02/27/95 | 12.04 | 4057.27 | 0.62 | |
| 03/27/95 | 12.33 | 4056.98 | -0.29 | |
| 04/28/95 | 12.94 | 4056.37 | -0.61 | |
| 05/26/95 | 12.79 | 4056.52 | 0.15 | |
| 06/30/95 | 11.83 | 4057.48 | 0.96 | |
| 07/31/95 | 12.16 | 4057.15 | -0.33 | |
| 08/22/95 | 12.42 | 4056.89 | -0.26 | |
| 09/30/95 | 12.75 | 4056.56 | -0.33 | |
| 10/31/95 | 12.92 | 4056.39 | -0.17 | |
| 11/28/95 | 13.00 | 4056.31 | -0.08 | |
| 12/26/95 | 13.08 | 4056.04 | -0.27 | Well re-surveyed new reference elev.= 4069.12 |
| 01/16/96 | 13.06 | 4056.06 | 0.02 | |
| 10/08/96 | 12.40 | 4056.72 | 0.66 | |
| 04/29/97 | 11.23 | 4057.89 | 1.17 | |
| 12/10/97 | 10.65 | 4058.47 | 0.58 | |
| 11/19/98 | 14.69 | 4054.43 | -4.04 | |
| 05/06/99 | 15.54 | 4053.58 | -0.85 | |
| 10/20/99 | 16.62 | 4052.50 | -1.08 | |
| 04/25/00 | 17.60 | 4051.52 | -0.98 | |
| 10/18/00 | 17.87 | 4051.25 | -0.27 | |
| 04/07/01 | 18.94 | 4050.18 | -1.07 | |
| 05/11/07 | NM | | | |
| 03/03/09 | 14.90 | 4054.22 | | |

# FORMER BIG TIMBER LANDFILL

## Groundwater Elevation Data

Tetra Tech Project No. 9731053

**WELL NO. BT-4**
**REFERENCE ELEVATION: 4087.64**
**REFERENCE POINT TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS | |
|---|---|---|---|---|---|
| 09/08/89 | 16.62 | 4071.02 | | | |
| 07/19/90 | 16.79 | 4070.85 | -0.17 | | |
| 10/04/94 | 15.71 | 4071.93 | 1.08 | | |
| 01/30/95 | 14.66 | 4072.98 | 1.05 | | |
| 02/27/95 | 13.71 | 4073.93 | 0.95 | | |
| 03/27/95 | 13.96 | 4073.68 | -0.25 | | |
| 04/28/95 | 15.30 | 4072.34 | -1.34 | | |
| 05/26/95 | 14.42 | 4073.22 | 0.88 | | |
| 06/30/95 | 15.00 | 4072.64 | -0.58 | | |
| 07/31/95 | 14.58 | 4073.06 | 0.42 | | |
| 08/22/95 | 15.58 | 4072.06 | -1.00 | | |
| 09/30/95 | 15.16 | 4072.48 | 0.42 | | |
| 10/31/95 | 15.92 | 4071.72 | -0.76 | | |
| 11/28/95 | 16.00 | 4071.64 | -0.08 | | |
| 12/26/95 | 16.17 | 4071.28 | -0.36 | Well re-surveyed new reference elev.= | 4087.45 |
| 01/16/96 | 16.04 | 4071.41 | 0.13 | | |
| 10/08/96 | 15.51 | 4071.94 | 0.53 | | |
| 04/29/97 | 15.31 | 4072.14 | 0.20 | | |
| 12/10/97 | 15.68 | 4071.77 | -0.37 | | |
| 11/19/98 | 16.34 | 4071.11 | -0.66 | | |
| 05/06/99 | 16.93 | 4070.52 | -0.59 | | |
| 10/20/99 | 17.07 | 4070.38 | -0.14 | | |
| 04/25/00 | 17.42 | 4070.03 | -0.35 | | |
| 10/18/00 | 17.88 | 4069.57 | -0.46 | | |
| 04/07/01 | 18.31 | 4069.14 | -0.43 | | |
| 05/11/07 | NM | | | | |
| 03/03/09 | 16.22 | 4071.23 | | | |

**WELL NO. BT-5**
**REFERENCE ELEVATION: 4069.25**
**REFERENCE POINT TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS | |
|---|---|---|---|---|---|
| 07/19/90 | 18.45 | 4050.80 | | | |
| 10/04/94 | 16.04 | 4053.21 | 2.41 | | |
| 01/30/95 | 14.00 | 4055.25 | 2.04 | | |
| 02/27/95 | 12.08 | 4057.17 | 1.92 | | |
| 03/27/95 | 13.75 | 4055.50 | -1.67 | | |
| 04/28/95 | 15.25 | 4054.00 | -1.50 | | |
| 05/26/95 | 14.83 | 4054.42 | 0.42 | | |
| 06/30/95 | 14.58 | 4054.67 | 0.25 | | |
| 07/31/95 | 14.50 | 4054.75 | 0.08 | | |
| 08/22/95 | 14.83 | 4054.42 | -0.33 | | |
| 09/30/95 | 15.25 | 4054.00 | -0.42 | | |
| 10/31/95 | 15.42 | 4053.83 | -0.17 | | |
| 11/28/95 | 15.42 | 4053.83 | 0.00 | | |
| 12/26/95 | 15.58 | 4053.38 | -0.45 | Well re-surveyed new reference elev.= | 4068.96 |
| 01/16/96 | 15.55 | 4053.41 | 0.03 | | |
| 10/08/96 | 14.71 | 4054.25 | 0.84 | | |
| 04/29/97 | 13.47 | 4055.49 | 1.24 | | |
| 12/10/97 | 12.97 | 4055.99 | 0.50 | | |
| 11/19/98 | 16.99 | 4051.97 | -4.02 | | |
| 05/06/99 | 17.60 | 4051.36 | -0.61 | | |
| 10/20/99 | 18.82 | 4050.14 | -1.22 | | |
| 04/25/00 | 19.24 | 4049.72 | -0.42 | | |
| 10/18/00 | 20.38 | 4048.58 | -1.14 | | |
| 04/07/01 | 20.69 | 4048.27 | -0.31 | | |
| 05/11/07 | NM | | | | |
| 03/03/09 | 17.42 | 4051.54 | | | |

# FORMER BIG TIMBER LANDFILL

## Groundwater Elevation Data

Tetra Tech Project No. 9731053

**WELL NO. BT-6**
**REFERENCE ELEVATION: 4057.57**
**REFERENCE POINT TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 07/19/90 | 22.65 | 4034.92 | | |
| 10/04/94 | 17.88 | 4039.69 | 4.77 | |
| 01/30/95 | 22.83 | 4034.74 | -4.95 | |
| 02/27/95 | 24.46 | 4033.11 | -1.63 | |
| 03/27/95 | 24.92 | 4032.65 | -0.46 | |
| 04/28/95 | 27.25 | 4030.32 | -2.33 | |
| 05/26/95 | 26.92 | 4030.65 | 0.33 | |
| 06/30/95 | 26.08 | 4031.49 | 0.84 | |
| 07/31/95 | 25.58 | 4031.99 | 0.50 | |
| 08/22/95 | 25.92 | 4031.65 | -0.34 | |
| 09/30/95 | 26.00 | 4031.57 | -0.08 | |
| 10/31/95 | 25.75 | 4031.82 | 0.25 | |
| 11/28/95 | 25.92 | 4031.65 | -0.17 | |
| 12/26/95 | 26.75 | 4030.94 | -0.71 | Well re-surveyed new reference elev.= 4057.69 |
| 01/16/96 | 26.91 | 4030.78 | -0.16 | |
| 10/08/96 | 21.60 | 4036.09 | 5.31 | |
| 04/29/97 | 27.21 | 4030.48 | -5.61 | |
| 12/10/97 | 23.79 | 4033.90 | 3.42 | |
| 11/19/98 | 25.53 | 4032.16 | -1.74 | |
| 05/06/99 | 28.37 | 4029.32 | -2.84 | |
| 10/20/99 | 25.52 | 4032.17 | 2.85 | |
| 04/25/00 | 28.82 | 4028.87 | -3.30 | |
| 10/18/00 | 22.93 | 4034.76 | 5.89 | |
| 04/07/01 | 29.02 | 4028.67 | -6.09 | |
| 05/11/07 | NM | | | Well is dry |
| 03/03/09 | 27.90 | 4029.79 | | |

**WELL NO. BT-7**
**REFERENCE ELEVATION: 4085.71**
**REFERENCE POINT TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 12/26/95 | 39.58 | 4046.13 | | |
| 01/16/96 | 38.47 | 4047.24 | 1.11 | |
| 10/08/96 | 38.00 | 4047.71 | 0.47 | |
| 04/29/97 | 38.21 | 4047.50 | -0.21 | |
| 12/10/97 | 38.15 | 4047.56 | 0.06 | |
| 11/19/98 | 39.20 | 4046.51 | -1.05 | |
| 05/06/99 | 39.60 | 4046.11 | -0.40 | |
| 10/20/99 | 39.71 | 4046.00 | -0.11 | |
| 04/25/00 | 39.98 | 4045.73 | -0.27 | |
| 10/18/00 | 39.35 | 4046.36 | 0.63 | |
| 04/07/01 | 40.08 | 4045.63 | -0.73 | |
| 05/11/07 | 40.18 | 4045.53 | -0.10 | |
| 03/03/09 | 39.50 | 4046.21 | 0.68 | |

Notes: NM=Not measured

# Appendix B

# Groundwater Sampling Logs

# GROUNDWATER SAMPLING LOG

Project: Big Timber Landfill **Sample Date:** ~~3~~ 3-3-09 **Sample Time:** 13:00 **Well ID:** BT-1S

Personnel: RS Weather:

Casing Diameter/Type: 2" PVC Measuring Point Description: Nth

Well Depth (feet below measuring point): ~~37.0RS~~ 28.20 Depth to Water 19.41 ft water

Screen: Depth to Product

## WELL EVACUATION

Method: [ ] Mechanical Bailer, [ ] Galvanized Bailer, [ ] PVC Bailer, ☒ Disp. Polyethylene Bailer, [ ] SST Bailer, [ ] Submersible Pump, **[ ] Peri pump** [ ] Other:

8.79 ft. water x ____ gal./ft * = one casing volume 1.4 gals. x 3 = purge volume 4.2 gals.

**SCH 40 Pipe*** 2" well = 0.163 gal./ft. [✓] 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = $5.875 \times C^2$

Water Quality: ODOR: YES or [✓ NO] SHEEN: YES or [✓ NO]

Comments: Water is Clear

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| 1250 | | | | | | |
| 1252 | 1.0 | 14.3°C | 7.27 | 1087 | 22.7 | 4.4 |
| 1254 | 2.0 | 15.7 | 7.36 | 1081 | 32.0 | 4.2 |
| 1256 | 3.0 | 15.6 | 7.32 | 1150 | 32.5 | 3.0 |
| 1258 | 4.0 | 15.7 | 7.34 | 1158 | 34.1 | 2.5 |
| | | | | | | |
| 1300 | Sample | | | | | |

## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, [ ] Submersible Pump, **[ ] Peri Pump** [ ] Other: ____ Sample Type: ☒ Natural, [ ] Duplicate, [ ] Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| [ ] | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| [ ] | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| [ ] | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| [ ] | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| [ ] | Methane | (1) 40 ml VOA | None | |
| [ ] | Sulfate | (1) 250 ml poly plastic | None | |
| [ ] | HACH | (1) 1-liter poly plastic | None | |
| ☒ | ~~Metals Common Ions~~ | (1) 125 ml poly plastic | Nitric acid | Filtered: ☒ Yes, [ ] No |
| [ ] | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| [ ] | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| [ ] | PAHs | (2) 1-liter amber glass | None | |
| ☒ | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| [ ] | | | | |
| [ ] | | | | |

Laboratory: Severn Trent: [ ] Arvada, CO, [ ] Austin, TX, ☒ Northern Analytical Other ____ Chain-of-Custody: ☒ Yes, [ ] No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | ~~3-24~~ 3-3-09 |
| SC | " | " |
| ORP | " | " |
| DO | ysi 550 | " |

**Decontamination**

Potable Water: ☒ Yes No [ ] Nitric Acid: Yes [ ] ☒ No

Liquinox: ☒ Yes No [ ] DI Water: ☒ Yes No [ ]

Methanol: ☒ Yes No [ ]

Comments:

# GROUNDWATER SAMPLING LOG

Project: Big timber landfill Sample Date: 3-3-09 Sample Time: ______ Well ID: BT-101

Personnel: RS Weather: ______

Casing Diameter/Type: 2" PVC Measuring Point Description: Nth

Well Depth (feet below measuring point): ~~37.0"~~ 28.2 Depth to Water 19.41 ft water

Screen: ______ Depth to Product ______

## WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☒ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, **☐ Peri pump** ☐ Other:

______ ft. water x ______ gal./ft * = one casing volume ______ gals. x 3 = purge volume 4.2 gals.

**SCH 40 Pipe*** 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Water Quality: ______ ODOR: YES or NO SHEEN: YES or NO

Comments: ______

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | Duplicate of BT-1S | | | | | |
| | | | | | | |
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## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, ☐ Submersible Pump, **☐ Peri Pump** ☐ Other: ______ Sample Type: ☐ Natural, ☒ Duplicate, ☐ Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| ☐ | Methane | (1) 40 ml VOA | None | |
| ☐ | Sulfate | (1) 250 ml poly plastic | None | |
| ☐ | HACH | (1) 1-liter poly plastic | None | |
| ☐ | Metals | (1) 125 ml poly plastic | Nitric acid | Filtered: ☐ Yes, ☐ No |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| ☐ | PAHs | (2) 1-liter amber glass | None | |
| ☐ | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | | | | |
| ☐ | | | | |

Laboratory: Severn Trent: ☐ Arvada, CO, ☐ Austin, TX, ☒ Northern Analytical Other______ Chain-of-Custody: ☒ Yes, ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | |
| SC | " | |
| ORP | " | |
| DO | ysi 550 | |

Decontamination

Potable Water: Yes ☒ No ☐ Nitric Acid: Yes ☐ No ☒

Liquinox: Yes ☒ No ☐ DI Water: Yes ☒ No ☐

Methanol: Yes ☒ No ☐

Comments: ______

N:ENVIRO\FORMS\GWSAMPLING LOG 2004

# GROUNDWATER SAMPLING LOG

Project: Big Timber Landfill **Sample Date:** 3-3-09 **Sample Time:** 13:50 **Well ID:** BT-2

Personnel: RS Weather:

Casing Diameter/Type: 2' PVC Measuring Point Description: NA

Well Depth (feet below measuring point): ~~135'~~ 44.11 Depth to Water 27.79 ft water

Screen: Depth to Product

---

WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☑ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, **☐ Peri pump** ☐ Other:

16.32 ft. water x 0.163 gal./ft * = one casing volume 2.66 gals. x 3 = purge volume 7.98 gals.

**SCH 40 Pipe** * 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Water Quality: ODOR: YES or [✓ NO] SHEEN: YES or [✓ NO]

Comments: Slight brown tint.

EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| 1340 | — | | | | | |
| 1342 | 1 | 15.7° C | 7.33 | 573 | 67.9 | 2.02 |
| 1344 | 2 | 15.1 | 7.48 | 571 | 44.9 | 0.86 |
| 1346 | 3 | 15.8 | 7.68 | 570 | 19.7 | 0.62 |
| 1348 | 4 | 15.9 | 7.66 | 570 | 14.1 | 0.65 |

Well not re-charging sampled @ 4 gallons

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WELL SAMPLING

Sampling Method: ☑ Disposable Poly Bailer, ☐ Submersible Pump, **☐ Peri Pump** ☐ Other: Sample Type: ☑ Natural, ☐ Duplicate, ☐ Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| ☐ | Methane | (1) 40 ml VOA | None | |
| ☑ | ~~Sulfate~~ Common Ions | (1) 250 ml poly plastic | None | |
| ☐ | HACH | (1) 1-liter poly plastic | None | |
| ☑ | Metals | (1) 125 ml poly plastic | Nitric acid | Filtered: ☑ Yes, ☐ No |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| ☐ | PAHs | (2) 1-liter amber glass | None | |
| ☑ | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| ☑ | Cyanide | | | |
| ☑ | nutrients | | | |

Laboratory: Severn Trent: ☐ Arvada, CO, ☐ Austin, TX, ☑ Northern Analytical Other Chain-of-Custody: ☑ Yes, ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | 3-3-09 |
| SC | " | " |
| ORP | " | " |
| DO | YSI 550 | " |

Decontamination

Potable Water: Yes ☑ No ☐ Nitric Acid: Yes ☐ No ☑

Liquinox: Yes ☑ No ☐ DI Water: Yes ☑ No ☐

Methanol: Yes ☐ No ☐

Comments:

# GROUNDWATER SAMPLING LOG

Project: Big Timber Landfill **Sample Date:** 3-3-09 **Sample Time:** 13:35 **Well ID:** BT-6

Personnel: RS Weather:

Casing Diameter/Type: 2" PVC Measuring Point Description: N14

Well Depth (feet below measuring point): 28.9 Depth to Water 27.90 ft water

Screen: Depth to Product

## WELL EVACUATION

Method: [ ] Mechanical Bailer, [ ] Galvanized Bailer, [ ] PVC Bailer, [ ] Disp. Polyethylene Bailer, [ ] SST Bailer, [ ] Submersible Pump, **[ ] Peri pump** [ ] Other:

~~1.3~~ ft. water x 0.163 gal./ft * = one casing volume ~~0.7~~ gals. x 3 = purge volume ~~2.1~~ gals.

**SCH 40 Pipe*** 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Water Quality: ODOR: YES or NO SHEEN: YES or NO

Comments:

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| | | | | | | |
| 1325 | | | | | | |
| 1327 | 0.5 | | | | | |
| 1329 | 1.0 | Well | is | Dry | | |
| 1331 | 1.5 | | | | | |
| 1333 | 2.0 | | | | | |
| | | | | | | |
| | | | | | | |
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| | | | | | | |

## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, [ ] Submersible Pump, **[ ] Peri Pump** [ ] Other: Sample Type: ☒ Natural, [ ] Duplicate, [ ] Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| [ ] | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| [ ] | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| [ ] | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| [ ] | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| [ ] | Methane | (1) 40 ml VOA | None | |
| ☒ | ~~Sulfate~~ Common Ions | (1) 250 ml poly plastic | None | |
| [ ] | HACH | (1) 1-liter poly plastic | None | |
| ☒ | Metals | (1) 125 ml poly plastic | Nitric acid | Filtered: ☒ Yes, [ ] No |
| [ ] | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| [ ] | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| [ ] | PAHs | (2) 1-liter amber glass | None | |
| ☒ | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| [ ] | cyanide | | | |
| [ ] | nutrients | | | |

Laboratory: Severn Trent: [ ] Arvada, CO, [ ] Austin, TX, ☒ Northern Analytical Other Chain-of-Custody: ☒ Yes, [ ] No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | |
| SC | | |
| ORP | | |
| DO | ysi 550 | |

Decontamination

Potable Water: Yes [✓] No [ ] Nitric Acid: Yes [ ] No [✓]

Liquinox: Yes [✓] No [ ] DI Water: Yes [✓] No [ ]

Methanol: Yes [✓] No [ ]

Comments:

N:ENVIRO\FORMS\GWSAMPLING LOG 2004

# GROUNDWATER SAMPLING LOG

**Project:** Big Timber Landfill **Sample Date:** 3-3-09 **Sample Time:** 14 25 **Well ID:** BT-7

Personnel: RS Weather:

Casing Diameter/Type: 2" PVC Measuring Point Description: Nth

Well Depth (feet below measuring point): 49.7' Depth to Water 39.50 ft water

Screen: Depth to Product

## WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☒ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, **☐ Peri pump** ☐ Other:

10.2 ft. water x 0.163 gal./ft * = one casing volume 1.7 gals. x 3 = purge volume 5.1 gals.

**SCH 40 Pipe*** 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Water Quality: ODOR: YES or [✓ NO] SHEEN: YES or [✓ NO]

Comments:

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| 14 15 | - | | | | | |
| 14 17 | 0.5 | 16.6 °C | 6.48 | 1128 ~~1128~~ | 71.2 | 0.81 |
| 14 19 | 1.0 | 16.1 | 6.55 | 1100 | 73.5 | 0.72 |
| 14 21 | 1.5 | 16.2 | 6.57 | 1082 | 81.9 | 0.89 |
| 14 23 | 2.0 | 15.6 | 6.47 | 1068 | 86.9 | 0.80 |
| 14 25 | sampled | | | | | |

## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, ☐ Submersible Pump, **☐ Peri Pump** ☐ Other: Sample Type: ☒ Natural, ☐ Duplicate, ☐ Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| ☐ | Methane | (1) 40 ml VOA | None | |
| ☒ | ~~Sulfate~~ | (1) 250 ml poly plastic | None | |
| ☐ | HACH | (1) 1-liter poly plastic | None | |
| ☒ | Metals | (1) 125 ml poly plastic | Nitric acid | Filtered: ☐ Yes, ☐ No |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| ☐ | PAHs | (2) 1-liter amber glass | None | |
| ☒ | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| ☒ | nutrients | | | |
| ☒ | Cyanide | | | |

Laboratory: Severn Trent: ☐ Arvada, CO, ☐ Austin, TX, ☒ Northern Analytical Other Chain-of-Custody: ☒ Yes, ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | 3-3-09 |
| SC | " | " |
| ORP | " | " |
| DO | YS. 550 | " |

Decontamination

Potable Water: Yes ☒ No ☐ Nitric Acid: Yes ☐ No ☒

Liquinox: Yes ☒ No ☐ DI Water: Yes ☒ No ☐

Methanol: Yes ☒ No ☐

Comments:

# GROUNDWATER SAMPLING LOG

Project: Big Timber landfill **Sample Date:** 3-3-09 **Sample Time:** 1440 **Well ID:** Field Blank

Personnel: RS Weather: ________

Casing Diameter/Type: ________ Measuring Point Description: ________

Well Depth (feet below measuring point): ________ Depth to Water ________ ft water

Screen: ________ Depth to Product ________

---

WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☐ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, **☐ Peri pump** ☐ Other:

________ ft. water x ________ gal./ft * = one casing volume ________ gals. x 3 = purge volume ________ gals.

**SCH 40 Pipe*** 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Water Quality: ________ ODOR: YES or NO SHEEN: YES or NO

Comments: ________

EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| | | | | | | |
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WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, ☐ Submersible Pump, **☐ Peri Pump** ☐ Other: ________ Sample Type: ☐ Natural, ☐ Duplicate, ☒ Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| ☐ | Methane | (1) 40 ml VOA | None | |
| ☐ | Sulfate | (1) 250 ml poly plastic | None | |
| ☐ | HACH | (1) 1-liter poly plastic | None | |
| ☐ | Metals | (1) 125 ml poly plastic | Nitric acid | Filtered: ☐ Yes, ☐ No |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| ☐ | PAHs | (2) 1-liter amber glass | None | |
| ☒ | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | | | | |
| ☐ | | | | |

Laboratory: Severn Trent: ☐ Arvada, CO, ☐ Austin, TX, ☐ Northern Analytical Other ________ Chain-of-Custody: ☐ Yes, ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | | |
| SC | | |
| ORP | | |
| DO | | |

Decontamination

Potable Water: Yes ☐ No ☐ Nitric Acid: Yes ☐ No ☐

Liquinox: Yes ☐ No ☐ DI Water: Yes ☐ No ☐

Methanol: Yes ☐ No ☐

Comments: ________

# Appendix C

# Laboratory Analytical Report

Pace Analytical®
www.pacelabs.com

**Pace Analytical Services, Inc.**
602 S 25th Street
Billings, MT 591014549
(406)254-7226

RECEIVED
MAR 31 2009

March 26, 2009

Jeffrey Rice
Tetra Tech, Inc.
PO Box 30615
Billings, MT 59107

RE: Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

Dear Jeffrey Rice:
Enclosed are the analytical results for sample(s) received by the laboratory on March 03, 2009. The results relate only to the samples included in this report.

The report has been revised. The sample identification of sample 1 has been corrected from BT-15 to BT-1S. The metals concentrations have been revised from ug/L values to mg/L values.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Denise Jensen

denise.jensen@pacelabs.com
Project Manager

Enclosures

## CERTIFICATIONS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

---

**Minnesota Certification IDs**

Tennessee Certification #: 02818
Wisconsin Certification #: 999407970
Washington Certification #: C754
Pennsylvania Certification #: 68-00563
Oregon Certification #: MN200001
North Dakota Certification #: R-036
North Carolina Certification #: 530
New York Certification #: 11647
New Jersey Certification #: MN-002
Montana Certification #: MT CERT0092
Minnesota Certification #: 027-053-137
Maine Certification #: 2007029
Louisiana Certification #: LA080009
Louisiana Certification #: 03086
Kansas Certification #: E-10167
Iowa Certification #: 368
Illinois Certification #: 200011
Florida/NELAP Certification #: E87605
California Certification #: 01155CA
Arizona Certification #: AZ-0014
Alaska Certification #: UST-078

**Montana Certification IDs**

Montana Certification #: MT CERT0040
Idaho Certification #: MT00012
EPA Region 8 Certification #: 8TMS-Q

**Green Bay Certification IDs**

Wisconsin DATCP Certification #: 105-444
Wisconsin DATCP Certification #: 105-444
Wisconsin Certification #: 405132750
Wisconsin Certification #: 405132750
South Carolina Certification #: 83006001
South Carolina Certification #: 83006001
North Dakota Certification #: R-200
North Dakota Certification #: R-150
North Carolina Certification #: 503
North Carolina Certification #: 503
New York Certification #: 11888
New York Certification #: 11887
Minnesota Certification #: 055-999-334
Minnesota Certification #: 055-999-334
Louisiana Certification #: 04169
Louisiana Certification #: 04168
Kentucky Certification #: 83
Kentucky Certification #: 82
Illinois Certification #: 200051
Illinois Certification #: 200050
Florida/NELAP Certification #: E87951
Florida/NELAP Certification #: E87948

## SAMPLE SUMMARY

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **1090383001** | **BT-1S** | Water | 03/03/09 13:00 | 03/03/09 17:00 |
| **1090383002** | **BT-101** | Water | 03/03/09 13:00 | 03/03/09 17:00 |
| **1090383003** | **BT-2** | Water | 03/03/09 13:50 | 03/03/09 17:00 |
| **1090383004** | **BT-7** | Water | 03/03/09 14:25 | 03/03/09 17:00 |
| **1090383005** | **FIELD BLANK** | Water | 03/03/09 14:40 | 03/03/09 17:00 |
| **1090383006** | **TRIP BLANK** | Water | 02/27/09 08:40 | 03/03/09 17:00 |

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## SAMPLE ANALYTE COUNT

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **1090383001** | **BT-1S** | EPA 1631E | GMW | 1 | PASI-G |
| | | EPA 300.0 | MK1 | 2 | PASI-MT |
| | | EPA 353.2 | CAC | 1 | PASI-MT |
| | | EPA 6020 | RJS | 16 | PASI-M |
| | | EPA 8260 | CNC | 52 | PASI-M |
| | | SM 2510B | MK1 | 1 | PASI-MT |
| | | SM 4500-CN-E | NMH | 1 | PASI-M |
| | | SM 4500-H+B | MK1 | 1 | PASI-MT |
| | | SM 5220C | MJS | 1 | PASI-M |
| **1090383002** | **BT-101** | EPA 1631E | GMW | 1 | PASI-G |
| | | EPA 300.0 | MK1 | 2 | PASI-MT |
| | | EPA 353.2 | CAC | 1 | PASI-MT |
| | | EPA 6020 | RJS | 16 | PASI-M |
| | | EPA 8260 | CNC | 52 | PASI-M |
| | | SM 2510B | MK1 | 1 | PASI-MT |
| | | SM 4500-CN-E | NMH | 1 | PASI-M |
| | | SM 4500-H+B | MK1 | 1 | PASI-MT |
| | | SM 5220C | MJS | 1 | PASI-M |
| **1090383003** | **BT-2** | EPA 1631E | GMW | 1 | PASI-G |
| | | EPA 300.0 | MK1 | 2 | PASI-MT |
| | | EPA 353.2 | CAC | 1 | PASI-MT |
| | | EPA 6020 | RJS | 16 | PASI-M |
| | | EPA 8260 | CNC | 52 | PASI-M |
| | | SM 2510B | MK1 | 1 | PASI-MT |
| | | SM 4500-CN-E | NMH | 1 | PASI-M |
| | | SM 4500-H+B | MK1 | 1 | PASI-MT |
| | | SM 5220C | MJS | 1 | PASI-M |
| **1090383004** | **BT-7** | EPA 1631E | GMW | 1 | PASI-G |
| | | EPA 300.0 | MK1 | 2 | PASI-MT |
| | | EPA 353.2 | CAC | 1 | PASI-MT |
| | | EPA 6020 | RJS | 16 | PASI-M |
| | | EPA 8260 | CNC | 52 | PASI-M |
| | | SM 2510B | MK1 | 1 | PASI-MT |
| | | SM 4500-CN-E | NMH | 1 | PASI-M |
| | | SM 4500-H+B | MK1 | 1 | PASI-MT |
| | | SM 5220C | MJS | 1 | PASI-M |
| **1090383005** | **FIELD BLANK** | EPA 8260 | CNC | 52 | PASI-M |

## SAMPLE ANALYTE COUNT

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **1090383006** | **TRIP BLANK** | EPA 8260 | CNC | 52 | PASI-M |

## PROJECT NARRATIVE

| | |
|---|---|
| Project: | Big Timber Landfill REVISED |
| Pace Project No.: | 1090383 |

| | |
|---|---|
| **Method:** | **EPA 1631E** |
| **Description:** | 1631E Mercury, Low Level |
| **Client:** | Tetra Tech, Inc. - MT |
| **Date:** | March 26, 2009 |

**General Information:**
4 samples were analyzed for EPA 1631E. All samples were received in acceptable condition with any exceptions noted below.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Internal Standards:**
All internal standards were within QC limits with any exceptions noted below.

**Surrogates:**
All surrogates were within QC limits with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

Analyte Comments:

QC Batch: CVFS/1464

2M: Sample was not received in Pace - GB LLHg Bottle.

- BT-101 (Lab ID: 1090383002)
  - Mercury
- BT-1S (Lab ID: 1090383001)
  - Mercury
- BT-2 (Lab ID: 1090383003)
  - Mercury
- BT-7 (Lab ID: 1090383004)
  - Mercury

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## PROJECT NARRATIVE

| | |
|---|---|
| Project: | Big Timber Landfill REVISED |
| Pace Project No.: | 1090383 |

---

**Method:** **EPA 1631E**
**Description:** 1631E Mercury, Low Level
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

Analyte Comments:

QC Batch: CVFS/1464

3M: Sample was recieved in a Poly Container.

- BT-1S (Lab ID: 1090383001)
  - Mercury

## PROJECT NARRATIVE

| | |
|---|---|
| Project: | Big Timber Landfill REVISED |
| Pace Project No.: | 1090383 |

**Method:** **EPA 6020**
**Description:** 6020 MET ICPMS, Dissolved
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

**General Information:**
4 samples were analyzed for EPA 6020. All samples were received in acceptable condition with any exceptions noted below.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Sample Preparation:**
The samples were prepared in accordance with EPA 3020 with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

QC Batch: MPRP/14923

CH: The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.

- LCS (Lab ID: 590204)
  - Silver, Dissolved
- MS (Lab ID: 590205)
  - Silver, Dissolved
- MSD (Lab ID: 590206)
  - Silver, Dissolved

**Internal Standards:**
All internal standards were within QC limits with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Method:** **EPA 8260**
**Description:** 8260 MSV
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

**General Information:**
6 samples were analyzed for EPA 8260. All samples were received in acceptable condition with any exceptions noted below.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Internal Standards:**
All internal standards were within QC limits with any exceptions noted below.

**Surrogates:**
All surrogates were within QC limits with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: MSV/11860

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 1090513001

M3: Matrix spike recovery was outside laboratory control limits due to matrix interferences.

- MS (Lab ID: 592050)
  - Vinyl acetate
- MSD (Lab ID: 592051)
  - Vinyl acetate

R1: RPD value was outside control limits.

- MSD (Lab ID: 592051)
  - Carbon disulfide

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

## PROJECT NARRATIVE

| | |
|---|---|
| Project: | Big Timber Landfill REVISED |
| Pace Project No.: | 1090383 |

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**Method:** **EPA 300.0**
**Description:** 300.0 IC Anions
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

**General Information:**
4 samples were analyzed for EPA 300.0. All samples were received in acceptable condition with any exceptions noted below.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Internal Standards:**
All internal standards were within QC limits with any exceptions noted below.

**Surrogates:**
All surrogates were within QC limits with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

## PROJECT NARRATIVE

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Method:** **EPA 353.2**
**Description:** 353.2 Nitrate + Nitrite pres.
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

**General Information:**
4 samples were analyzed for EPA 353.2. All samples were received in acceptable condition with any exceptions noted below.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Internal Standards:**
All internal standards were within QC limits with any exceptions noted below.

**Surrogates:**
All surrogates were within QC limits with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

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## PROJECT NARRATIVE

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

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**Method:** **SM 2510B**
**Description:** 2510B Specific Conductance
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

**General Information:**
4 samples were analyzed for SM 2510B. All samples were received in acceptable condition with any exceptions noted below.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Internal Standards:**
All internal standards were within QC limits with any exceptions noted below.

**Surrogates:**
All surrogates were within QC limits with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

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## PROJECT NARRATIVE

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

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**Method:** **SM 4500-H+B**
**Description:** 4500H+ pH, Electrometric
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

**General Information:**
4 samples were analyzed for SM 4500-H+B. All samples were received in acceptable condition with any exceptions noted below.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

H6: Analysis initiated more than 15 minutes after sample collection.
- BT-101 (Lab ID: 1090383002)
- BT-1S (Lab ID: 1090383001)
- BT-2 (Lab ID: 1090383003)
- BT-7 (Lab ID: 1090383004)

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Internal Standards:**
All internal standards were within QC limits with any exceptions noted below.

**Surrogates:**
All surrogates were within QC limits with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

## PROJECT NARRATIVE

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

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**Method:** **SM 5220C**
**Description:** SM5220C, COD - Low
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

**General Information:**
4 samples were analyzed for SM 5220C. All samples were received in acceptable condition with any exceptions noted below.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

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**Method:** **SM 4500-CN-E**
**Description:** SM4500CN-E Cyanide
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

**General Information:**
4 samples were analyzed for SM 4500-CN-E. All samples were received in acceptable condition with any exceptions noted below.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: WETA/7794

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 1090383001

M0: Matrix spike recovery was outside laboratory control limits.

- MSD (Lab ID: 594825)
  - Cyanide

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

Analyte Comments:

QC Batch: WETA/7794

1M: Sample prepped within hold time, but analyzed out of hold.

- BT-101 (Lab ID: 1090383002)
  - Cyanide
- BT-1S (Lab ID: 1090383001)
  - Cyanide
- BT-2 (Lab ID: 1090383003)
  - Cyanide
- BT-7 (Lab ID: 1090383004)
  - Cyanide

# PROJECT NARRATIVE

| | |
|---|---|
| Project: | Big Timber Landfill REVISED |
| Pace Project No.: | 1090383 |

**Method:** SM 4500-CN-E
**Description:** SM4500CN-E Cyanide
**Client:** Tetra Tech, Inc. - MT
**Date:** March 26, 2009

Analyte Comments:

QC Batch: WETA/7794

1M: Sample prepped within hold time, but analyzed out of hold.
- MS (Lab ID: 594824)
    - Cyanide
- MSD (Lab ID: 594825)
    - Cyanide

This data package has been reviewed for quality and completeness and is approved for release.

# ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-1S** **Lab ID: 1090383001** Collected: 03/03/09 13:00 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **1631E Mercury, Low Level** | Analytical Method: EPA 1631E | | | | | | | | |
| Mercury | **8.35** | ng/L | 5.0 | 1.2 | 10 | 03/05/09 16:15 | 03/11/09 06:37 | 7439-97-6 | 2M,3M |
| **6020 MET ICPMS, Dissolved** | Analytical Method: EPA 6020 Preparation Method: EPA 3020 | | | | | | | | |
| Antimony, Dissolved | **0.000062J** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/09/09 14:01 | 7440-36-0 | |
| Arsenic, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-38-2 | |
| Barium, Dissolved | **0.024** | mg/L | 0.00030 | 0.00015 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-39-3 | |
| Beryllium, Dissolved | **0.00018J** | mg/L | 0.00020 | 0.00010 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-41-7 | |
| Cadmium, Dissolved | **0.0010** | mg/L | 0.000080 | 0.000040 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-43-9 | |
| Chromium, Dissolved | **0.0017** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-47-3 | |
| Cobalt, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-48-4 | |
| Copper, Dissolved | **0.0013** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-50-8 | |
| Iron, Dissolved | **<0.025** | mg/L | 0.050 | 0.025 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7439-89-6 | |
| Lead, Dissolved | **<0.000050** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7439-92-1 | |
| Nickel, Dissolved | **0.0012** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-02-0 | |
| Selenium, Dissolved | **0.0088** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7782-49-2 | |
| Silver, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/09/09 14:01 | 7440-22-4 | |
| Thallium, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-28-0 | |
| Vanadium, Dissolved | **0.0016** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-62-2 | |
| Zinc, Dissolved | **0.0042J** | mg/L | 0.0050 | 0.0025 | 1 | 03/05/09 15:49 | 03/05/09 16:56 | 7440-66-6 | |
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| Acetone | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 19:40 | 67-64-1 | |
| Acrylonitrile | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 19:40 | 107-13-1 | |
| Benzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 71-43-2 | |
| Bromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 74-97-5 | |
| Bromodichloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 75-27-4 | |
| Bromoform | **<4.0** | ug/L | 8.0 | 4.0 | 1 | | 03/06/09 19:40 | 75-25-2 | |
| Bromomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:40 | 74-83-9 | |
| 2-Butanone (MEK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:40 | 78-93-3 | |
| Carbon disulfide | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 75-15-0 | |
| Carbon tetrachloride | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 56-23-5 | |
| Chlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 108-90-7 | |
| Chloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 75-00-3 | |
| Chloroform | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 67-66-3 | |
| Chloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 74-87-3 | |
| 1,2-Dibromo-3-chloropropane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:40 | 96-12-8 | |
| Dibromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 124-48-1 | |
| 1,2-Dibromoethane (EDB) | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 106-93-4 | |
| Dibromomethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 74-95-3 | |
| 1,2-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 95-50-1 | |
| 1,4-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 106-46-7 | |
| trans-1,4-Dichloro-2-butene | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 19:40 | 110-57-6 | |
| Dichlorodifluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 75-71-8 | |
| 1,1-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 75-34-3 | |
| 1,2-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 107-06-2 | |
| 1,1-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 75-35-4 | |

# ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-1S** Lab ID: **1090383001** Collected: 03/03/09 13:00 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| cis-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 156-59-2 | |
| trans-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 156-60-5 | |
| 1,2-Dichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 78-87-5 | |
| cis-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:40 | 10061-01-5 | |
| trans-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:40 | 10061-02-6 | |
| Ethylbenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 100-41-4 | |
| 2-Hexanone | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:40 | 591-78-6 | |
| Iodomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:40 | 74-88-4 | |
| Methylene Chloride | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:40 | 75-09-2 | |
| 4-Methyl-2-pentanone (MIBK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:40 | 108-10-1 | |
| Styrene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 100-42-5 | |
| 1,1,1,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 630-20-6 | |
| 1,1,2,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 79-34-5 | |
| Tetrachloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 127-18-4 | |
| Toluene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 108-88-3 | |
| 1,1,1-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 71-55-6 | |
| 1,1,2-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 79-00-5 | |
| Trichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 79-01-6 | |
| Trichlorofluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 75-69-4 | |
| 1,2,3-Trichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:40 | 96-18-4 | |
| Vinyl acetate | **<10.0** | ug/L | 20.0 | 10.0 | 1 | | 03/06/09 19:40 | 108-05-4 | |
| Vinyl chloride | **<0.20** | ug/L | 0.40 | 0.20 | 1 | | 03/06/09 19:40 | 75-01-4 | |
| Xylene (Total) | **<1.5** | ug/L | 3.0 | 1.5 | 1 | | 03/06/09 19:40 | 1330-20-7 | |
| 1,2-Dichloroethane-d4 (S) | 104 | % | 75-125 | | 1 | | 03/06/09 19:40 | 17060-07-0 | |
| Dibromofluoromethane (S) | 99 | % | 75-125 | | 1 | | 03/06/09 19:40 | 1868-53-7 | |
| 4-Bromofluorobenzene (S) | 102 | % | 75-125 | | 1 | | 03/06/09 19:40 | 460-00-4 | |
| Toluene-d8 (S) | 101 | % | 75-125 | | 1 | | 03/06/09 19:40 | 2037-26-5 | |
| **2510B Specific Conductance** | Analytical Method: SM 2510B | | | | | | | | |
| Specific Conductance | **1350** | umhos/cm | 10.0 | 5.0 | 1 | | 03/06/09 14:05 | | |
| **300.0 IC Anions** | Analytical Method: EPA 300.0 | | | | | | | | |
| Chloride | **100** | mg/L | 5.0 | 2.5 | 5 | | 03/12/09 18:50 | 16887-00-6 | |
| Sulfate | **336** | mg/L | 25.0 | 12.5 | 5 | | 03/12/09 18:50 | 14808-79-8 | |
| **353.2 Nitrate + Nitrite pres.** | Analytical Method: EPA 353.2 | | | | | | | | |
| Nitrogen, NO2 plus NO3 | **4.4** | mg/L | 0.20 | 0.10 | 20 | | 03/10/09 13:41 | | |
| **4500H+ pH, Electrometric** | Analytical Method: SM 4500-H+B | | | | | | | | |
| pH at 25 Degrees C | **7.9** | Std. Units | 0.10 | 0.050 | 1 | | 03/04/09 17:35 | | H6 |
| **SM5220C, COD - Low** | Analytical Method: SM 5220C | | | | | | | | |
| Chemical Oxygen Demand | **6.2J** | mg/L | 10.0 | 5.0 | 1 | | 03/13/09 13:31 | | |

# ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-1S** Lab ID: 1090383001 Collected: 03/03/09 13:00 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **SM4500CN-E Cyanide** | Analytical Method: SM 4500-CN-E | | | | | | | | |
| Cyanide | <0.0050 | mg/L | 0.010 | 0.0050 | 1 | | 03/20/09 09:29 | 57-12-5 | 1M,M0 |

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## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-101** **Lab ID: 1090383002** Collected: 03/03/09 13:00 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **1631E Mercury, Low Level** | Analytical Method: EPA 1631E | | | | | | | | |
| Mercury | **7.18** | ng/L | 5.0 | 1.2 | 10 | 03/05/09 16:15 | 03/11/09 06:46 | 7439-97-6 | 2M |
| **6020 MET ICPMS, Dissolved** | Analytical Method: EPA 6020 Preparation Method: EPA 3020 | | | | | | | | |
| Antimony, Dissolved | **0.000091J** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-36-0 | |
| Arsenic, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-38-2 | |
| Barium, Dissolved | **0.025** | mg/L | 0.00030 | 0.00015 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-39-3 | |
| Beryllium, Dissolved | **0.00011J** | mg/L | 0.00020 | 0.00010 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-41-7 | |
| Cadmium, Dissolved | **0.0010** | mg/L | 0.000080 | 0.000040 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-43-9 | |
| Chromium, Dissolved | **0.0017** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-47-3 | |
| Cobalt, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-48-4 | |
| Copper, Dissolved | **0.0013** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-50-8 | |
| Iron, Dissolved | **<0.025** | mg/L | 0.050 | 0.025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7439-89-6 | |
| Lead, Dissolved | **<0.000050** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7439-92-1 | |
| Nickel, Dissolved | **0.0016** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-02-0 | |
| Selenium, Dissolved | **0.0089** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7782-49-2 | |
| Silver, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-22-4 | |
| Thallium, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-28-0 | |
| Vanadium, Dissolved | **0.0017** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-62-2 | |
| Zinc, Dissolved | **0.0036J** | mg/L | 0.0050 | 0.0025 | 1 | 03/05/09 15:49 | 03/05/09 17:13 | 7440-66-6 | |
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| Acetone | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 20:03 | 67-64-1 | |
| Acrylonitrile | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 20:03 | 107-13-1 | |
| Benzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 71-43-2 | |
| Bromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 74-97-5 | |
| Bromodichloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 75-27-4 | |
| Bromoform | **<4.0** | ug/L | 8.0 | 4.0 | 1 | | 03/06/09 20:03 | 75-25-2 | |
| Bromomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:03 | 74-83-9 | |
| 2-Butanone (MEK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:03 | 78-93-3 | |
| Carbon disulfide | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 75-15-0 | |
| Carbon tetrachloride | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 56-23-5 | |
| Chlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 108-90-7 | |
| Chloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 75-00-3 | |
| Chloroform | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 67-66-3 | |
| Chloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 74-87-3 | |
| 1,2-Dibromo-3-chloropropane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:03 | 96-12-8 | |
| Dibromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 124-48-1 | |
| 1,2-Dibromoethane (EDB) | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 106-93-4 | |
| Dibromomethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 74-95-3 | |
| 1,2-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 95-50-1 | |
| 1,4-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 106-46-7 | |
| trans-1,4-Dichloro-2-butene | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 20:03 | 110-57-6 | |
| Dichlorodifluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 75-71-8 | |
| 1,1-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 75-34-3 | |
| 1,2-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 107-06-2 | |
| 1,1-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 75-35-4 | |

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## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-101** **Lab ID: 1090383002** Collected: 03/03/09 13:00 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| cis-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 156-59-2 | |
| trans-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 156-60-5 | |
| 1,2-Dichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 78-87-5 | |
| cis-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:03 | 10061-01-5 | |
| trans-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:03 | 10061-02-6 | |
| Ethylbenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 100-41-4 | |
| 2-Hexanone | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:03 | 591-78-6 | |
| Iodomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:03 | 74-88-4 | |
| Methylene Chloride | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:03 | 75-09-2 | |
| 4-Methyl-2-pentanone (MIBK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:03 | 108-10-1 | |
| Styrene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 100-42-5 | |
| 1,1,1,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 630-20-6 | |
| 1,1,2,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 79-34-5 | |
| Tetrachloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 127-18-4 | |
| Toluene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 108-88-3 | |
| 1,1,1-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 71-55-6 | |
| 1,1,2-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 79-00-5 | |
| Trichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 79-01-6 | |
| Trichlorofluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 75-69-4 | |
| 1,2,3-Trichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:03 | 96-18-4 | |
| Vinyl acetate | **<10.0** | ug/L | 20.0 | 10.0 | 1 | | 03/06/09 20:03 | 108-05-4 | |
| Vinyl chloride | **<0.20** | ug/L | 0.40 | 0.20 | 1 | | 03/06/09 20:03 | 75-01-4 | |
| Xylene (Total) | **<1.5** | ug/L | 3.0 | 1.5 | 1 | | 03/06/09 20:03 | 1330-20-7 | |
| 1,2-Dichloroethane-d4 (S) | 103 | % | 75-125 | | 1 | | 03/06/09 20:03 | 17060-07-0 | |
| Dibromofluoromethane (S) | 102 | % | 75-125 | | 1 | | 03/06/09 20:03 | 1868-53-7 | |
| 4-Bromofluorobenzene (S) | 103 | % | 75-125 | | 1 | | 03/06/09 20:03 | 460-00-4 | |
| Toluene-d8 (S) | 101 | % | 75-125 | | 1 | | 03/06/09 20:03 | 2037-26-5 | |
| **2510B Specific Conductance** | Analytical Method: SM 2510B | | | | | | | | |
| Specific Conductance | **1310** | umhos/cm | 10.0 | 5.0 | 1 | | 03/06/09 14:05 | | |
| **300.0 IC Anions** | Analytical Method: EPA 300.0 | | | | | | | | |
| Chloride | **99.5** | mg/L | 5.0 | 2.5 | 5 | | 03/12/09 19:51 | 16887-00-6 | |
| Sulfate | **331** | mg/L | 25.0 | 12.5 | 5 | | 03/12/09 19:51 | 14808-79-8 | |
| **353.2 Nitrate + Nitrite pres.** | Analytical Method: EPA 353.2 | | | | | | | | |
| Nitrogen, NO2 plus NO3 | **4.3** | mg/L | 0.20 | 0.10 | 20 | | 03/10/09 13:43 | | |
| **4500H+ pH, Electrometric** | Analytical Method: SM 4500-H+B | | | | | | | | |
| pH at 25 Degrees C | **7.9** | Std. Units | 0.10 | 0.050 | 1 | | 03/04/09 17:35 | | H6 |
| **SM5220C, COD - Low** | Analytical Method: SM 5220C | | | | | | | | |
| Chemical Oxygen Demand | **<5.0** | mg/L | 10.0 | 5.0 | 1 | | 03/13/09 13:31 | | |

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## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-101** **Lab ID: 1090383002** Collected: 03/03/09 13:00 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **SM4500CN-E Cyanide** | Analytical Method: SM 4500-CN-E | | | | | | | | |
| Cyanide | **<0.0050** | mg/L | 0.010 | 0.0050 | 1 | | 03/20/09 09:29 | 57-12-5 | 1M |

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## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-2** **Lab ID: 1090383003** Collected: 03/03/09 13:50 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **1631E Mercury, Low Level** | Analytical Method: EPA 1631E | | | | | | | | |
| Mercury | **10.8** | ng/L | 5.0 | 1.2 | 10 | 03/05/09 16:15 | 03/11/09 06:51 | 7439-97-6 | 2M |
| **6020 MET ICPMS, Dissolved** | Analytical Method: EPA 6020 Preparation Method: EPA 3020 | | | | | | | | |
| Antimony, Dissolved | **<0.000050** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-36-0 | |
| Arsenic, Dissolved | **0.00051** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-38-2 | |
| Barium, Dissolved | **0.017** | mg/L | 0.00030 | 0.00015 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-39-3 | |
| Beryllium, Dissolved | **<0.00010** | mg/L | 0.00020 | 0.00010 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-41-7 | |
| Cadmium, Dissolved | **<0.000040** | mg/L | 0.000080 | 0.000040 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-43-9 | |
| Chromium, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-47-3 | |
| Cobalt, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-48-4 | |
| Copper, Dissolved | **0.00025J** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-50-8 | |
| Iron, Dissolved | **<0.025** | mg/L | 0.050 | 0.025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7439-89-6 | |
| Lead, Dissolved | **<0.000050** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7439-92-1 | |
| Nickel, Dissolved | **0.00074** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-02-0 | |
| Selenium, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7782-49-2 | |
| Silver, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-22-4 | |
| Thallium, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-28-0 | |
| Vanadium, Dissolved | **0.00040** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-62-2 | |
| Zinc, Dissolved | **<0.0025** | mg/L | 0.0050 | 0.0025 | 1 | 03/05/09 15:49 | 03/05/09 17:34 | 7440-66-6 | |
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| Acetone | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 20:25 | 67-64-1 | |
| Acrylonitrile | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 20:25 | 107-13-1 | |
| Benzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 71-43-2 | |
| Bromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 74-97-5 | |
| Bromodichloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 75-27-4 | |
| Bromoform | **<4.0** | ug/L | 8.0 | 4.0 | 1 | | 03/06/09 20:25 | 75-25-2 | |
| Bromomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:25 | 74-83-9 | |
| 2-Butanone (MEK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:25 | 78-93-3 | |
| Carbon disulfide | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 75-15-0 | |
| Carbon tetrachloride | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 56-23-5 | |
| Chlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 108-90-7 | |
| Chloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 75-00-3 | |
| Chloroform | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 67-66-3 | |
| Chloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 74-87-3 | |
| 1,2-Dibromo-3-chloropropane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:25 | 96-12-8 | |
| Dibromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 124-48-1 | |
| 1,2-Dibromoethane (EDB) | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 106-93-4 | |
| Dibromomethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 74-95-3 | |
| 1,2-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 95-50-1 | |
| 1,4-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 106-46-7 | |
| trans-1,4-Dichloro-2-butene | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 20:25 | 110-57-6 | |
| Dichlorodifluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 75-71-8 | |
| 1,1-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 75-34-3 | |
| 1,2-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 107-06-2 | |
| 1,1-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 75-35-4 | |

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## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-2** | **Lab ID: 1090383003** | Collected: 03/03/09 13:50 | Received: 03/03/09 17:00 | Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| cis-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 156-59-2 | |
| trans-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 156-60-5 | |
| 1,2-Dichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 78-87-5 | |
| cis-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:25 | 10061-01-5 | |
| trans-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:25 | 10061-02-6 | |
| Ethylbenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 100-41-4 | |
| 2-Hexanone | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:25 | 591-78-6 | |
| Iodomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:25 | 74-88-4 | |
| Methylene Chloride | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:25 | 75-09-2 | |
| 4-Methyl-2-pentanone (MIBK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:25 | 108-10-1 | |
| Styrene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 100-42-5 | |
| 1,1,1,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 630-20-6 | |
| 1,1,2,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 79-34-5 | |
| Tetrachloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 127-18-4 | |
| Toluene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 108-88-3 | |
| 1,1,1-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 71-55-6 | |
| 1,1,2-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 79-00-5 | |
| Trichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 79-01-6 | |
| Trichlorofluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 75-69-4 | |
| 1,2,3-Trichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:25 | 96-18-4 | |
| Vinyl acetate | **<10.0** | ug/L | 20.0 | 10.0 | 1 | | 03/06/09 20:25 | 108-05-4 | |
| Vinyl chloride | **<0.20** | ug/L | 0.40 | 0.20 | 1 | | 03/06/09 20:25 | 75-01-4 | |
| Xylene (Total) | **<1.5** | ug/L | 3.0 | 1.5 | 1 | | 03/06/09 20:25 | 1330-20-7 | |
| 1,2-Dichloroethane-d4 (S) | 107 | % | 75-125 | | 1 | | 03/06/09 20:25 | 17060-07-0 | |
| Dibromofluoromethane (S) | 102 | % | 75-125 | | 1 | | 03/06/09 20:25 | 1868-53-7 | |
| 4-Bromofluorobenzene (S) | 102 | % | 75-125 | | 1 | | 03/06/09 20:25 | 460-00-4 | |
| Toluene-d8 (S) | 97 | % | 75-125 | | 1 | | 03/06/09 20:25 | 2037-26-5 | |
| **2510B Specific Conductance** | Analytical Method: SM 2510B | | | | | | | | |
| Specific Conductance | **524** | umhos/cm | 10.0 | 5.0 | 1 | | 03/06/09 14:05 | | |
| **300.0 IC Anions** | Analytical Method: EPA 300.0 | | | | | | | | |
| Chloride | **32.0** | mg/L | 5.0 | 2.5 | 5 | | 03/12/09 20:21 | 16887-00-6 | |
| Sulfate | **145** | mg/L | 25.0 | 12.5 | 5 | | 03/12/09 20:21 | 14808-79-8 | |
| **353.2 Nitrate + Nitrite pres.** | Analytical Method: EPA 353.2 | | | | | | | | |
| Nitrogen, NO2 plus NO3 | **0.020** | mg/L | 0.010 | 0.0050 | 1 | | 03/10/09 13:56 | | |
| **4500H+ pH, Electrometric** | Analytical Method: SM 4500-H+B | | | | | | | | |
| pH at 25 Degrees C | **8.3** | Std. Units | 0.10 | 0.050 | 1 | | 03/04/09 17:35 | | H6 |
| **SM5220C, COD - Low** | Analytical Method: SM 5220C | | | | | | | | |
| Chemical Oxygen Demand | **<5.0** | mg/L | 10.0 | 5.0 | 1 | | 03/13/09 13:31 | | |

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## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-2** Lab ID: 1090383003 Collected: 03/03/09 13:50 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **SM4500CN-E Cyanide** | Analytical Method: SM 4500-CN-E | | | | | | | | |
| Cyanide | **<0.0050** | mg/L | 0.010 | 0.0050 | 1 | | 03/20/09 09:29 | 57-12-5 | 1M |

## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-7** **Lab ID: 1090383004** Collected: 03/03/09 14:25 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **1631E Mercury, Low Level** | Analytical Method: EPA 1631E | | | | | | | | |
| Mercury | **11.7** | ng/L | 5.0 | 1.2 | 10 | 03/05/09 16:15 | 03/11/09 06:56 | 7439-97-6 | 2M |
| **6020 MET ICPMS, Dissolved** | Analytical Method: EPA 6020 Preparation Method: EPA 3020 | | | | | | | | |
| Antimony, Dissolved | **<0.000050** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-36-0 | |
| Arsenic, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-38-2 | |
| Barium, Dissolved | **0.026** | mg/L | 0.00030 | 0.00015 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-39-3 | |
| Beryllium, Dissolved | **<0.00010** | mg/L | 0.00020 | 0.00010 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-41-7 | |
| Cadmium, Dissolved | **0.000089** | mg/L | 0.000080 | 0.000040 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-43-9 | |
| Chromium, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-47-3 | |
| Cobalt, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-48-4 | |
| Copper, Dissolved | **0.00034J** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-50-8 | |
| Iron, Dissolved | **<0.025** | mg/L | 0.050 | 0.025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7439-89-6 | |
| Lead, Dissolved | **<0.000050** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7439-92-1 | |
| Nickel, Dissolved | **0.00037J** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-02-0 | |
| Selenium, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7782-49-2 | |
| Silver, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-22-4 | |
| Thallium, Dissolved | **<0.00025** | mg/L | 0.00050 | 0.00025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-28-0 | |
| Vanadium, Dissolved | **0.00060** | mg/L | 0.00010 | 0.000050 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-62-2 | |
| Zinc, Dissolved | **<0.0025** | mg/L | 0.0050 | 0.0025 | 1 | 03/05/09 15:49 | 03/05/09 17:42 | 7440-66-6 | |
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| Acetone | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 20:48 | 67-64-1 | |
| Acrylonitrile | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 20:48 | 107-13-1 | |
| Benzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 71-43-2 | |
| Bromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 74-97-5 | |
| Bromodichloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 75-27-4 | |
| Bromoform | **<4.0** | ug/L | 8.0 | 4.0 | 1 | | 03/06/09 20:48 | 75-25-2 | |
| Bromomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:48 | 74-83-9 | |
| 2-Butanone (MEK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:48 | 78-93-3 | |
| Carbon disulfide | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 75-15-0 | |
| Carbon tetrachloride | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 56-23-5 | |
| Chlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 108-90-7 | |
| Chloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 75-00-3 | |
| Chloroform | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 67-66-3 | |
| Chloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 74-87-3 | |
| 1,2-Dibromo-3-chloropropane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:48 | 96-12-8 | |
| Dibromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 124-48-1 | |
| 1,2-Dibromoethane (EDB) | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 106-93-4 | |
| Dibromomethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 74-95-3 | |
| 1,2-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 95-50-1 | |
| 1,4-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 106-46-7 | |
| trans-1,4-Dichloro-2-butene | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 20:48 | 110-57-6 | |
| Dichlorodifluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 75-71-8 | |
| 1,1-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 75-34-3 | |
| 1,2-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 107-06-2 | |
| 1,1-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 75-35-4 | |

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# ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-7** **Lab ID: 1090383004** Collected: 03/03/09 14:25 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| cis-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 156-59-2 | |
| trans-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 156-60-5 | |
| 1,2-Dichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 78-87-5 | |
| cis-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:48 | 10061-01-5 | |
| trans-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:48 | 10061-02-6 | |
| Ethylbenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 100-41-4 | |
| 2-Hexanone | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:48 | 591-78-6 | |
| Iodomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:48 | 74-88-4 | |
| Methylene Chloride | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:48 | 75-09-2 | |
| 4-Methyl-2-pentanone (MIBK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 20:48 | 108-10-1 | |
| Styrene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 100-42-5 | |
| 1,1,1,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 630-20-6 | |
| 1,1,2,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 79-34-5 | |
| Tetrachloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 127-18-4 | |
| Toluene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 108-88-3 | |
| 1,1,1-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 71-55-6 | |
| 1,1,2-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 79-00-5 | |
| Trichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 79-01-6 | |
| Trichlorofluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 75-69-4 | |
| 1,2,3-Trichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 20:48 | 96-18-4 | |
| Vinyl acetate | **<10.0** | ug/L | 20.0 | 10.0 | 1 | | 03/06/09 20:48 | 108-05-4 | |
| Vinyl chloride | **<0.20** | ug/L | 0.40 | 0.20 | 1 | | 03/06/09 20:48 | 75-01-4 | |
| Xylene (Total) | **<1.5** | ug/L | 3.0 | 1.5 | 1 | | 03/06/09 20:48 | 1330-20-7 | |
| 1,2-Dichloroethane-d4 (S) | 104 | % | 75-125 | | 1 | | 03/06/09 20:48 | 17060-07-0 | |
| Dibromofluoromethane (S) | 99 | % | 75-125 | | 1 | | 03/06/09 20:48 | 1868-53-7 | |
| 4-Bromofluorobenzene (S) | 103 | % | 75-125 | | 1 | | 03/06/09 20:48 | 460-00-4 | |
| Toluene-d8 (S) | 98 | % | 75-125 | | 1 | | 03/06/09 20:48 | 2037-26-5 | |
| **2510B Specific Conductance** | Analytical Method: SM 2510B | | | | | | | | |
| Specific Conductance | **1250** | umhos/cm | 10.0 | 5.0 | 1 | | 03/06/09 14:05 | | |
| **300.0 IC Anions** | Analytical Method: EPA 300.0 | | | | | | | | |
| Chloride | **182** | mg/L | 5.0 | 2.5 | 5 | | 03/12/09 20:52 | 16887-00-6 | |
| Sulfate | **232** | mg/L | 25.0 | 12.5 | 5 | | 03/12/09 20:52 | 14808-79-8 | |
| **353.2 Nitrate + Nitrite pres.** | Analytical Method: EPA 353.2 | | | | | | | | |
| Nitrogen, NO2 plus NO3 | **0.070** | mg/L | 0.010 | 0.0050 | 1 | | 03/10/09 13:57 | | |
| **4500H+ pH, Electrometric** | Analytical Method: SM 4500-H+B | | | | | | | | |
| pH at 25 Degrees C | **7.7** | Std. Units | 0.10 | 0.050 | 1 | | 03/04/09 17:35 | | H6 |
| **SM5220C, COD - Low** | Analytical Method: SM 5220C | | | | | | | | |
| Chemical Oxygen Demand | **<5.0** | mg/L | 10.0 | 5.0 | 1 | | 03/13/09 13:31 | | |

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## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: BT-7** Lab ID: **1090383004** Collected: 03/03/09 14:25 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **SM4500CN-E Cyanide** | Analytical Method: SM 4500-CN-E | | | | | | | | |
| Cyanide | <0.0050 | mg/L | 0.010 | 0.0050 | 1 | | 03/20/09 09:29 | 57-12-5 | 1M |

## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: FIELD BLANK** **Lab ID: 1090383005** Collected: 03/03/09 14:40 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| Acetone | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 19:18 | 67-64-1 | |
| Acrylonitrile | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 19:18 | 107-13-1 | |
| Benzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 71-43-2 | |
| Bromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 74-97-5 | |
| Bromodichloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 75-27-4 | |
| Bromoform | **<4.0** | ug/L | 8.0 | 4.0 | 1 | | 03/06/09 19:18 | 75-25-2 | |
| Bromomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:18 | 74-83-9 | |
| 2-Butanone (MEK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:18 | 78-93-3 | |
| Carbon disulfide | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 75-15-0 | |
| Carbon tetrachloride | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 56-23-5 | |
| Chlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 108-90-7 | |
| Chloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 75-00-3 | |
| Chloroform | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 67-66-3 | |
| Chloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 74-87-3 | |
| 1,2-Dibromo-3-chloropropane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:18 | 96-12-8 | |
| Dibromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 124-48-1 | |
| 1,2-Dibromoethane (EDB) | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 106-93-4 | |
| Dibromomethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 74-95-3 | |
| 1,2-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 95-50-1 | |
| 1,4-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 106-46-7 | |
| trans-1,4-Dichloro-2-butene | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 19:18 | 110-57-6 | |
| Dichlorodifluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 75-71-8 | |
| 1,1-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 75-34-3 | |
| 1,2-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 107-06-2 | |
| 1,1-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 75-35-4 | |
| cis-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 156-59-2 | |
| trans-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 156-60-5 | |
| 1,2-Dichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 78-87-5 | |
| cis-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:18 | 10061-01-5 | |
| trans-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:18 | 10061-02-6 | |
| Ethylbenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 100-41-4 | |
| 2-Hexanone | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:18 | 591-78-6 | |
| Iodomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:18 | 74-88-4 | |
| Methylene Chloride | **2.6J** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:18 | 75-09-2 | |
| 4-Methyl-2-pentanone (MIBK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 19:18 | 108-10-1 | |
| Styrene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 100-42-5 | |
| 1,1,1,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 630-20-6 | |
| 1,1,2,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 79-34-5 | |
| Tetrachloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 127-18-4 | |
| Toluene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 108-88-3 | |
| 1,1,1-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 71-55-6 | |
| 1,1,2-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 79-00-5 | |
| Trichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 79-01-6 | |
| Trichlorofluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 75-69-4 | |
| 1,2,3-Trichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 19:18 | 96-18-4 | |
| Vinyl acetate | **<10.0** | ug/L | 20.0 | 10.0 | 1 | | 03/06/09 19:18 | 108-05-4 | |

## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: FIELD BLANK** Lab ID: **1090383005** Collected: 03/03/09 14:40 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| Vinyl chloride | **<0.20** | ug/L | 0.40 | 0.20 | 1 | | 03/06/09 19:18 | 75-01-4 | |
| Xylene (Total) | **<1.5** | ug/L | 3.0 | 1.5 | 1 | | 03/06/09 19:18 | 1330-20-7 | |
| 1,2-Dichloroethane-d4 (S) | 102 | % | 75-125 | | 1 | | 03/06/09 19:18 | 17060-07-0 | |
| Dibromofluoromethane (S) | 100 | % | 75-125 | | 1 | | 03/06/09 19:18 | 1868-53-7 | |
| 4-Bromofluorobenzene (S) | 102 | % | 75-125 | | 1 | | 03/06/09 19:18 | 460-00-4 | |
| Toluene-d8 (S) | 100 | % | 75-125 | | 1 | | 03/06/09 19:18 | 2037-26-5 | |

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## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: TRIP BLANK** Lab ID: **1090383006** Collected: 02/27/09 08:40 Received: 03/03/09 17:00 Matrix: Water

**8260 MSV** Analytical Method: EPA 8260

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| Acetone | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 17:26 | 67-64-1 | |
| Acrylonitrile | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 17:26 | 107-13-1 | |
| Benzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 71-43-2 | |
| Bromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 74-97-5 | |
| Bromodichloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 75-27-4 | |
| Bromoform | **<4.0** | ug/L | 8.0 | 4.0 | 1 | | 03/06/09 17:26 | 75-25-2 | |
| Bromomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 17:26 | 74-83-9 | |
| 2-Butanone (MEK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 17:26 | 78-93-3 | |
| Carbon disulfide | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 75-15-0 | |
| Carbon tetrachloride | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 56-23-5 | |
| Chlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 108-90-7 | |
| Chloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 75-00-3 | |
| Chloroform | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 67-66-3 | |
| Chloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 74-87-3 | |
| 1,2-Dibromo-3-chloropropane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 17:26 | 96-12-8 | |
| Dibromochloromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 124-48-1 | |
| 1,2-Dibromoethane (EDB) | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 106-93-4 | |
| Dibromomethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 74-95-3 | |
| 1,2-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 95-50-1 | |
| 1,4-Dichlorobenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 106-46-7 | |
| trans-1,4-Dichloro-2-butene | **<5.0** | ug/L | 10.0 | 5.0 | 1 | | 03/06/09 17:26 | 110-57-6 | |
| Dichlorodifluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 75-71-8 | |
| 1,1-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 75-34-3 | |
| 1,2-Dichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 107-06-2 | |
| 1,1-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 75-35-4 | |
| cis-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 156-59-2 | |
| trans-1,2-Dichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 156-60-5 | |
| 1,2-Dichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 78-87-5 | |
| cis-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 17:26 | 10061-01-5 | |
| trans-1,3-Dichloropropene | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 17:26 | 10061-02-6 | |
| Ethylbenzene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 100-41-4 | |
| 2-Hexanone | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 17:26 | 591-78-6 | |
| Iodomethane | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 17:26 | 74-88-4 | |
| Methylene Chloride | **2.1J** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 17:26 | 75-09-2 | |
| 4-Methyl-2-pentanone (MIBK) | **<2.0** | ug/L | 4.0 | 2.0 | 1 | | 03/06/09 17:26 | 108-10-1 | |
| Styrene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 100-42-5 | |
| 1,1,1,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 630-20-6 | |
| 1,1,2,2-Tetrachloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 79-34-5 | |
| Tetrachloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 127-18-4 | |
| Toluene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 108-88-3 | |
| 1,1,1-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 71-55-6 | |
| 1,1,2-Trichloroethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 79-00-5 | |
| Trichloroethene | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 79-01-6 | |
| Trichlorofluoromethane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 75-69-4 | |
| 1,2,3-Trichloropropane | **<0.50** | ug/L | 1.0 | 0.50 | 1 | | 03/06/09 17:26 | 96-18-4 | |
| Vinyl acetate | **<10.0** | ug/L | 20.0 | 10.0 | 1 | | 03/06/09 17:26 | 108-05-4 | |

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## ANALYTICAL RESULTS

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

**Sample: TRIP BLANK** **Lab ID: 1090383006** Collected: 02/27/09 08:40 Received: 03/03/09 17:00 Matrix: Water

| Parameters | Results | Units | PQL | MDL | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|---|
| **8260 MSV** | Analytical Method: EPA 8260 | | | | | | | | |
| Vinyl chloride | **<0.20** | ug/L | 0.40 | 0.20 | 1 | | 03/06/09 17:26 | 75-01-4 | |
| Xylene (Total) | **<1.5** | ug/L | 3.0 | 1.5 | 1 | | 03/06/09 17:26 | 1330-20-7 | |
| 1,2-Dichloroethane-d4 (S) | 106 | % | 75-125 | | 1 | | 03/06/09 17:26 | 17060-07-0 | |
| Dibromofluoromethane (S) | 104 | % | 75-125 | | 1 | | 03/06/09 17:26 | 1868-53-7 | |
| 4-Bromofluorobenzene (S) | 106 | % | 75-125 | | 1 | | 03/06/09 17:26 | 460-00-4 | |
| Toluene-d8 (S) | 99 | % | 75-125 | | 1 | | 03/06/09 17:26 | 2037-26-5 | |

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# QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

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QC Batch: CVFS/1464
Analysis Method: EPA 1631E
QC Batch Method: EPA 1631E
Analysis Description: 1631E Mercury
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

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METHOD BLANK: 134036 Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ng/L | 0.338J | 0.50 | 03/11/09 06:22 | |

METHOD BLANK: 134037 Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ng/L | 0.188J | 0.50 | 03/11/09 07:43 | |

METHOD BLANK: 134038 Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ng/L | 0.213J | 0.50 | 03/11/09 09:06 | |

LABORATORY CONTROL SAMPLE & LCSD: 134039 134040

| Parameter | Units | Spike Conc. | LCS Result | LCSD Result | LCS % Rec | LCSD % Rec | % Rec Limits | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ng/L | 5 | 5.04 | 4.75 | 101 | 95 | 79-121 | 6 | 24 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 134041 134042

| Parameter | Units | 1090383003 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ng/L | 10.8 | 50 | 50 | 56.8 | 64.1 | 92 | 107 | 75-125 | 12 | 24 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 134043 134044

| Parameter | Units | 1090383004 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ng/L | 11.7 | 50 | 50 | 65.5 | 66.1 | 108 | 109 | 75-125 | .8 | 24 | |

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## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

QC Batch: MT/1239
QC Batch Method: EPA 353.2
Analysis Method: EPA 353.2
Analysis Description: 353.2 Nitrate + Nitrite, preserved
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

METHOD BLANK: 588870
Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Nitrogen, NO2 plus NO3 | mg/L | <0.0050 | 0.010 | 03/10/09 13:13 | |

LABORATORY CONTROL SAMPLE: 588871

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Nitrogen, NO2 plus NO3 | mg/L | .33 | 0.33 | 99 | 90-110 | |

MATRIX SPIKE SAMPLE: 588873

| Parameter | Units | 1090103006 Result | Spike Conc. | MS Result | MS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|---|
| Nitrogen, NO2 plus NO3 | mg/L | 0.13 | .33 | 0.45 | 96 | 90-110 | |

MATRIX SPIKE SAMPLE: 592227

| Parameter | Units | 1090483001 Result | Spike Conc. | MS Result | MS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|---|
| Nitrogen, NO2 plus NO3 | mg/L | 7.0 | 16.7 | 22.0 | 90 | 90-110 | |

SAMPLE DUPLICATE: 588872

| Parameter | Units | 1090103001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Nitrogen, NO2 plus NO3 | mg/L | 0.010 | 0.010 | 0 | 20 | |

SAMPLE DUPLICATE: 591910

| Parameter | Units | 1090383002 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Nitrogen, NO2 plus NO3 | mg/L | 4.3 | 4.5 | 4 | 20 | |

## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

QC Batch: MT/1251 Analysis Method: SM 4500-H+B
QC Batch Method: SM 4500-H+B Analysis Description: 4500H+B pH
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

LABORATORY CONTROL SAMPLE: 589959

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| pH at 25 Degrees C | Std. Units | 5 | 5.1 | 101 | 98-102 | H6 |

SAMPLE DUPLICATE: 589960

| Parameter | Units | 1090425001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| pH at 25 Degrees C | Std. Units | 7.7 | 7.7 | 0 | 3 | H6 |

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## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

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QC Batch: MPRP/14923
QC Batch Method: EPA 3020
Analysis Method: EPA 6020
Analysis Description: 6020 MET Dissolved
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

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METHOD BLANK: 590203
Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Antimony, Dissolved | mg/L | <0.000050 | 0.00010 | 03/05/09 16:48 | |
| Arsenic, Dissolved | mg/L | <0.00025 | 0.00050 | 03/05/09 16:48 | |
| Barium, Dissolved | mg/L | 0.00020J | 0.00030 | 03/05/09 16:48 | |
| Beryllium, Dissolved | mg/L | <0.00010 | 0.00020 | 03/05/09 16:48 | |
| Cadmium, Dissolved | mg/L | <0.000040 | 0.000080 | 03/05/09 16:48 | |
| Chromium, Dissolved | mg/L | <0.00025 | 0.00050 | 03/05/09 16:48 | |
| Cobalt, Dissolved | mg/L | <0.00025 | 0.00050 | 03/05/09 16:48 | |
| Copper, Dissolved | mg/L | <0.00025 | 0.00050 | 03/05/09 16:48 | |
| Iron, Dissolved | mg/L | <0.025 | 0.050 | 03/05/09 16:48 | |
| Lead, Dissolved | mg/L | <0.000050 | 0.00010 | 03/05/09 16:48 | |
| Nickel, Dissolved | mg/L | <0.00025 | 0.00050 | 03/05/09 16:48 | |
| Selenium, Dissolved | mg/L | <0.00025 | 0.00050 | 03/05/09 16:48 | |
| Silver, Dissolved | mg/L | 0.00027J | 0.00050 | 03/05/09 16:48 | CU |
| Thallium, Dissolved | mg/L | <0.00025 | 0.00050 | 03/05/09 16:48 | |
| Vanadium, Dissolved | mg/L | <0.000050 | 0.00010 | 03/05/09 16:48 | |
| Zinc, Dissolved | mg/L | <0.0025 | 0.0050 | 03/05/09 16:48 | |

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LABORATORY CONTROL SAMPLE: 590204

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Antimony, Dissolved | mg/L | .08 | 0.080 | 101 | 85-115 | |
| Arsenic, Dissolved | mg/L | .08 | 0.079 | 99 | 85-115 | |
| Barium, Dissolved | mg/L | .08 | 0.077 | 97 | 85-115 | |
| Beryllium, Dissolved | mg/L | .08 | 0.070 | 88 | 85-115 | |
| Cadmium, Dissolved | mg/L | .08 | 0.077 | 97 | 85-115 | |
| Chromium, Dissolved | mg/L | .08 | 0.077 | 96 | 85-115 | |
| Cobalt, Dissolved | mg/L | .08 | 0.074 | 92 | 85-115 | |
| Copper, Dissolved | mg/L | .08 | 0.075 | 94 | 85-115 | |
| Iron, Dissolved | mg/L | 1 | 1.0 | 100 | 85-115 | |
| Lead, Dissolved | mg/L | .08 | 0.081 | 101 | 85-115 | |
| Nickel, Dissolved | mg/L | .08 | 0.071 | 89 | 85-115 | |
| Selenium, Dissolved | mg/L | .16 | 0.15 | 97 | 85-115 | |
| Silver, Dissolved | mg/L | .08 | 0.074 | 93 | 85-115 | CH |
| Thallium, Dissolved | mg/L | .08 | 0.080 | 100 | 85-115 | |
| Vanadium, Dissolved | mg/L | .08 | 0.073 | 92 | 85-115 | |
| Zinc, Dissolved | mg/L | .08 | 0.076 | 95 | 85-115 | |

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## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 590205 590206

| Parameter | Units | 1090383001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony, Dissolved | mg/L | 0.000062J | .08 | .08 | 0.084 | 0.085 | 105 | 106 | 70-130 | 1 | 20 | |
| Arsenic, Dissolved | mg/L | <0.00025 | .08 | .08 | 0.086 | 0.083 | 107 | 104 | 70-130 | 3 | 20 | |
| Barium, Dissolved | mg/L | 0.024 | .08 | .08 | 0.10 | 0.10 | 98 | 96 | 70-130 | 2 | 20 | |
| Beryllium, Dissolved | mg/L | 0.00018J | .08 | .08 | 0.076 | 0.066 | 95 | 82 | 70-130 | 15 | 20 | |
| Cadmium, Dissolved | mg/L | 0.0010 | .08 | .08 | 0.080 | 0.078 | 99 | 96 | 70-130 | 3 | 20 | |
| Chromium, Dissolved | mg/L | 0.0017 | .08 | .08 | 0.078 | 0.076 | 95 | 93 | 70-130 | 3 | 20 | |
| Cobalt, Dissolved | mg/L | <0.00025 | .08 | .08 | 0.077 | 0.075 | 96 | 94 | 70-130 | 2 | 20 | |
| Copper, Dissolved | mg/L | 0.0013 | .08 | .08 | 0.077 | 0.075 | 94 | 92 | 70-130 | 2 | 20 | |
| Iron, Dissolved | mg/L | <0.025 | 1 | 1 | 0.97 | 0.95 | 96 | 94 | 70-130 | 2 | 20 | |
| Lead, Dissolved | mg/L | <0.000050 | .08 | .08 | 0.075 | 0.072 | 94 | 90 | 70-130 | 4 | 20 | |
| Nickel, Dissolved | mg/L | 0.0012 | .08 | .08 | 0.074 | 0.072 | 92 | 88 | 70-130 | 3 | 20 | |
| Selenium, Dissolved | mg/L | 0.0088 | .16 | .16 | 0.17 | 0.17 | 104 | 101 | 70-130 | 3 | 20 | |
| Silver, Dissolved | mg/L | <0.00025 | .08 | .08 | 0.073 | 0.071 | 91 | 89 | 70-130 | 2 | 20 | CH |
| Thallium, Dissolved | mg/L | <0.00025 | .08 | .08 | 0.077 | 0.074 | 97 | 92 | 70-130 | 5 | 20 | |
| Vanadium, Dissolved | mg/L | 0.0016 | .08 | .08 | 0.076 | 0.074 | 93 | 90 | 70-130 | 3 | 20 | |
| Zinc, Dissolved | mg/L | 0.0042J | .08 | .08 | 0.080 | 0.078 | 95 | 92 | 70-130 | 3 | 20 | |

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## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

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QC Batch: MT/1262
QC Batch Method: SM 2510B
Analysis Method: SM 2510B
Analysis Description: 2510B Specific Conductance
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

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METHOD BLANK: 590557 Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Specific Conductance | umhos/cm | <5.0 | 10.0 | 03/06/09 14:05 | |

LABORATORY CONTROL SAMPLE: 590558

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Specific Conductance | umhos/cm | 1000 | 978 | 98 | 90-110 | |

SAMPLE DUPLICATE: 590559

| Parameter | Units | 1090425001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Specific Conductance | umhos/cm | 202 | 210 | 4 | 20 | |

SAMPLE DUPLICATE: 590560

| Parameter | Units | 1090383001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Specific Conductance | umhos/cm | 1350 | 1320 | 2 | 20 | |

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## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

QC Batch: MSV/11860
Analysis Method: EPA 8260
QC Batch Method: EPA 8260
Analysis Description: 8260 MSV
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004, 1090383005, 1090383006

METHOD BLANK: 590767
Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004, 1090383005, 1090383006

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,1,1-Trichloroethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,1,2,2-Tetrachloroethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,1,2-Trichloroethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,1-Dichloroethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,1-Dichloroethene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,2,3-Trichloropropane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,2-Dibromo-3-chloropropane | ug/L | <2.0 | 4.0 | 03/06/09 16:18 | |
| 1,2-Dibromoethane (EDB) | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,2-Dichlorobenzene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,2-Dichloroethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,2-Dichloropropane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 1,4-Dichlorobenzene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| 2-Butanone (MEK) | ug/L | <2.0 | 4.0 | 03/06/09 16:18 | |
| 2-Hexanone | ug/L | <2.0 | 4.0 | 03/06/09 16:18 | |
| 4-Methyl-2-pentanone (MIBK) | ug/L | <2.0 | 4.0 | 03/06/09 16:18 | |
| Acetone | ug/L | <5.0 | 10.0 | 03/06/09 16:18 | |
| Acrylonitrile | ug/L | <5.0 | 10.0 | 03/06/09 16:18 | |
| Benzene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Bromochloromethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Bromodichloromethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Bromoform | ug/L | <4.0 | 8.0 | 03/06/09 16:18 | |
| Bromomethane | ug/L | <2.0 | 4.0 | 03/06/09 16:18 | |
| Carbon disulfide | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Carbon tetrachloride | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Chlorobenzene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Chloroethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Chloroform | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Chloromethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| cis-1,2-Dichloroethene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| cis-1,3-Dichloropropene | ug/L | <2.0 | 4.0 | 03/06/09 16:18 | |
| Dibromochloromethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Dibromomethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Dichlorodifluoromethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Ethylbenzene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Iodomethane | ug/L | <2.0 | 4.0 | 03/06/09 16:18 | |
| Methylene Chloride | ug/L | <2.0 | 4.0 | 03/06/09 16:18 | |
| Styrene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Tetrachloroethene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Toluene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| trans-1,2-Dichloroethene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| trans-1,3-Dichloropropene | ug/L | <2.0 | 4.0 | 03/06/09 16:18 | |
| trans-1,4-Dichloro-2-butene | ug/L | <5.0 | 10.0 | 03/06/09 16:18 | |

## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

METHOD BLANK: 590767 Matrix: Water

Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004, 1090383005, 1090383006

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Trichloroethene | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Trichlorofluoromethane | ug/L | <0.50 | 1.0 | 03/06/09 16:18 | |
| Vinyl acetate | ug/L | <10.0 | 20.0 | 03/06/09 16:18 | |
| Vinyl chloride | ug/L | <0.20 | 0.40 | 03/06/09 16:18 | |
| Xylene (Total) | ug/L | <1.5 | 3.0 | 03/06/09 16:18 | |
| 1,2-Dichloroethane-d4 (S) | % | 107 | 75-125 | 03/06/09 16:18 | |
| 4-Bromofluorobenzene (S) | % | 103 | 75-125 | 03/06/09 16:18 | |
| Dibromofluoromethane (S) | % | 102 | 75-125 | 03/06/09 16:18 | |
| Toluene-d8 (S) | % | 104 | 75-125 | 03/06/09 16:18 | |

LABORATORY CONTROL SAMPLE: 590768

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ug/L | 50 | 53.9 | 108 | 75-135 | |
| 1,1,1-Trichloroethane | ug/L | 50 | 53.7 | 107 | 75-132 | |
| 1,1,2,2-Tetrachloroethane | ug/L | 50 | 51.2 | 102 | 75-125 | |
| 1,1,2-Trichloroethane | ug/L | 50 | 52.8 | 106 | 75-125 | |
| 1,1-Dichloroethane | ug/L | 50 | 53.9 | 108 | 75-125 | |
| 1,1-Dichloroethene | ug/L | 50 | 48.4 | 97 | 75-127 | |
| 1,2,3-Trichloropropane | ug/L | 50 | 50.0 | 100 | 75-125 | |
| 1,2-Dibromo-3-chloropropane | ug/L | 50 | 51.3 | 103 | 67-125 | |
| 1,2-Dibromoethane (EDB) | ug/L | 50 | 52.9 | 106 | 75-125 | |
| 1,2-Dichlorobenzene | ug/L | 50 | 53.7 | 107 | 75-125 | |
| 1,2-Dichloroethane | ug/L | 50 | 55.6 | 111 | 75-125 | |
| 1,2-Dichloropropane | ug/L | 50 | 56.1 | 112 | 75-125 | |
| 1,4-Dichlorobenzene | ug/L | 50 | 53.5 | 107 | 75-125 | |
| 2-Butanone (MEK) | ug/L | 50 | 46.8 | 94 | 68-127 | |
| 2-Hexanone | ug/L | 50 | 49.2 | 98 | 75-125 | |
| 4-Methyl-2-pentanone (MIBK) | ug/L | 50 | 50.2 | 100 | 68-133 | |
| Acetone | ug/L | 125 | 116 | 93 | 65-139 | |
| Acrylonitrile | ug/L | 500 | 499 | 100 | 74-128 | |
| Benzene | ug/L | 50 | 53.6 | 107 | 75-125 | |
| Bromochloromethane | ug/L | 50 | 53.0 | 106 | 75-127 | |
| Bromodichloromethane | ug/L | 50 | 57.4 | 115 | 75-125 | |
| Bromoform | ug/L | 100 | 111 | 111 | 67-125 | |
| Bromomethane | ug/L | 50 | 58.9 | 118 | 65-150 | |
| Carbon disulfide | ug/L | 50 | 52.8 | 106 | 64-134 | |
| Carbon tetrachloride | ug/L | 50 | 54.1 | 108 | 67-133 | |
| Chlorobenzene | ug/L | 50 | 52.7 | 105 | 75-125 | |
| Chloroethane | ug/L | 50 | 47.9 | 96 | 75-129 | |
| Chloroform | ug/L | 50 | 54.1 | 108 | 75-125 | |
| Chloromethane | ug/L | 50 | 42.5 | 85 | 67-135 | |
| cis-1,2-Dichloroethene | ug/L | 50 | 51.1 | 102 | 75-125 | |
| cis-1,3-Dichloropropene | ug/L | 50 | 58.9 | 118 | 75-125 | |
| Dibromochloromethane | ug/L | 50 | 55.1 | 110 | 73-125 | |

# QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

LABORATORY CONTROL SAMPLE: 590768

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Dibromomethane | ug/L | 50 | 54.7 | 109 | 75-125 | |
| Dichlorodifluoromethane | ug/L | 50 | 45.6 | 91 | 55-150 | |
| Ethylbenzene | ug/L | 50 | 54.5 | 109 | 75-125 | |
| Iodomethane | ug/L | 50 | 57.7 | 115 | 54-139 | |
| Methylene Chloride | ug/L | 50 | 48.6 | 97 | 63-125 | |
| Styrene | ug/L | 50 | 54.2 | 108 | 75-125 | |
| Tetrachloroethene | ug/L | 50 | 51.4 | 103 | 75-125 | |
| Toluene | ug/L | 50 | 53.9 | 108 | 75-125 | |
| trans-1,2-Dichloroethene | ug/L | 50 | 50.8 | 102 | 75-125 | |
| trans-1,3-Dichloropropene | ug/L | 50 | 58.2 | 116 | 69-125 | |
| trans-1,4-Dichloro-2-butene | ug/L | 125 | 137 | 110 | 61-128 | |
| Trichloroethene | ug/L | 50 | 53.8 | 108 | 75-125 | |
| Trichlorofluoromethane | ug/L | 50 | 51.5 | 103 | 75-135 | |
| Vinyl acetate | ug/L | 50 | 54.6 | 109 | 50-150 | |
| Vinyl chloride | ug/L | 50 | 46.8 | 94 | 71-133 | |
| Xylene (Total) | ug/L | 150 | 159 | 106 | 75-125 | |
| 1,2-Dichloroethane-d4 (S) | % | | | 105 | 75-125 | |
| 4-Bromofluorobenzene (S) | % | | | 102 | 75-125 | |
| Dibromofluoromethane (S) | % | | | 102 | 75-125 | |
| Toluene-d8 (S) | % | | | 101 | 75-125 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 592050 592051

| Parameter | Units | 1090513001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ug/L | ND | 400 | 400 | 429 | 422 | 107 | 106 | 75-135 | 2 | 30 | |
| 1,1,1-Trichloroethane | ug/L | ND | 400 | 400 | 443 | 417 | 111 | 104 | 75-140 | 6 | 30 | |
| 1,1,2,2-Tetrachloroethane | ug/L | ND | 400 | 400 | 400 | 410 | 100 | 103 | 75-130 | 2 | 30 | |
| 1,1,2-Trichloroethane | ug/L | ND | 400 | 400 | 412 | 411 | 103 | 103 | 75-125 | .2 | 30 | |
| 1,1-Dichloroethane | ug/L | ND | 400 | 400 | 448 | 418 | 112 | 105 | 70-140 | 7 | 30 | |
| 1,1-Dichloroethene | ug/L | ND | 400 | 400 | 401 | 378 | 100 | 94 | 75-141 | 6 | 30 | |
| 1,2,3-Trichloropropane | ug/L | ND | 400 | 400 | 410 | 419 | 103 | 105 | 74-126 | 2 | 30 | |
| 1,2-Dibromo-3-chloropropane | ug/L | ND | 400 | 400 | 404 | 420 | 101 | 105 | 67-125 | 4 | 30 | |
| 1,2-Dibromoethane (EDB) | ug/L | ND | 400 | 400 | 392 | 413 | 98 | 103 | 75-125 | 5 | 30 | |
| 1,2-Dichlorobenzene | ug/L | ND | 400 | 400 | 413 | 410 | 103 | 102 | 75-125 | .9 | 30 | |
| 1,2-Dichloroethane | ug/L | ND | 400 | 400 | 439 | 412 | 110 | 103 | 75-130 | 6 | 30 | |
| 1,2-Dichloropropane | ug/L | ND | 400 | 400 | 435 | 419 | 109 | 105 | 75-126 | 4 | 30 | |
| 1,4-Dichlorobenzene | ug/L | ND | 400 | 400 | 415 | 408 | 104 | 102 | 75-125 | 2 | 30 | |
| 2-Butanone (MEK) | ug/L | 548 | 400 | 400 | 1010 | 925 | 115 | 94 | 68-127 | 9 | 30 | |
| 2-Hexanone | ug/L | ND | 400 | 400 | 395 | 388 | 99 | 97 | 67-125 | 2 | 30 | |
| 4-Methyl-2-pentanone (MIBK) | ug/L | 106 | 400 | 400 | 524 | 518 | 105 | 103 | 68-133 | 1 | 30 | |
| Acetone | ug/L | 892 | 1000 | 1000 | 1740 | 1750 | 85 | 86 | 50-150 | .3 | 30 | |
| Acrylonitrile | ug/L | ND | 4000 | 4000 | 4050 | 3790 | 101 | 95 | 75-125 | 7 | 30 | |
| Benzene | ug/L | ND | 400 | 400 | 453 | 410 | 108 | 97 | 75-126 | 10 | 30 | |
| Bromochloromethane | ug/L | ND | 400 | 400 | 432 | 399 | 108 | 100 | 75-127 | 8 | 30 | |
| Bromodichloromethane | ug/L | ND | 400 | 400 | 437 | 414 | 109 | 103 | 72-130 | 5 | 30 | |
| Bromoform | ug/L | ND | 800 | 800 | 808 | 749 | 101 | 94 | 56-125 | 8 | 30 | |

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## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 592050 592051

| Parameter | Units | 1090513001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bromomethane | ug/L | ND | 400 | 400 | 521 | 484 | 130 | 121 | 50-150 | 7 | 30 | |
| Carbon disulfide | ug/L | ND | 400 | 400 | 409 | 291 | 102 | 73 | 50-147 | 34 | 30 | R1 |
| Carbon tetrachloride | ug/L | ND | 400 | 400 | 444 | 406 | 111 | 101 | 68-144 | 9 | 30 | |
| Chlorobenzene | ug/L | ND | 400 | 400 | 405 | 397 | 101 | 99 | 75-125 | 2 | 30 | |
| Chloroethane | ug/L | ND | 400 | 400 | 431 | 417 | 108 | 104 | 75-142 | 4 | 30 | |
| Chloroform | ug/L | ND | 400 | 400 | 438 | 418 | 109 | 104 | 75-134 | 5 | 30 | |
| Chloromethane | ug/L | ND | 400 | 400 | 417 | 404 | 104 | 101 | 61-148 | 3 | 30 | |
| cis-1,2-Dichloroethene | ug/L | ND | 400 | 400 | 411 | 381 | 103 | 95 | 65-148 | 7 | 30 | |
| cis-1,3-Dichloropropene | ug/L | ND | 400 | 400 | 457 | 430 | 114 | 107 | 59-132 | 6 | 30 | |
| Dibromochloromethane | ug/L | ND | 400 | 400 | 404 | 402 | 101 | 100 | 63-125 | .5 | 30 | |
| Dibromomethane | ug/L | ND | 400 | 400 | 404 | 393 | 101 | 98 | 75-125 | 3 | 30 | |
| Dichlorodifluoromethane | ug/L | ND | 400 | 400 | 491 | 455 | 123 | 114 | 50-150 | 8 | 30 | |
| Ethylbenzene | ug/L | ND | 400 | 400 | 425 | 412 | 106 | 103 | 75-126 | 3 | 30 | |
| Iodomethane | ug/L | ND | 400 | 400 | 404 | 418 | 101 | 105 | 56-150 | 3 | 30 | |
| Methylene Chloride | ug/L | ND | 400 | 400 | 381 | 353 | 95 | 88 | 62-133 | 8 | 30 | |
| Styrene | ug/L | ND | 400 | 400 | 396 | 396 | 99 | 99 | 50-144 | .05 | 30 | |
| Tetrachloroethene | ug/L | ND | 400 | 400 | 400 | 389 | 100 | 97 | 75-133 | 3 | 30 | |
| Toluene | ug/L | 25.6 | 400 | 400 | 446 | 430 | 105 | 101 | 75-125 | 4 | 30 | |
| trans-1,2-Dichloroethene | ug/L | ND | 400 | 400 | 407 | 377 | 102 | 94 | 75-138 | 8 | 30 | |
| trans-1,3-Dichloropropene | ug/L | ND | 400 | 400 | 438 | 431 | 110 | 108 | 59-125 | 2 | 30 | |
| trans-1,4-Dichloro-2-butene | ug/L | ND | 1000 | 1000 | 1100 | 1000 | 110 | 100 | 72-135 | 9 | 30 | |
| Trichloroethene | ug/L | ND | 400 | 400 | 430 | 402 | 108 | 100 | 75-130 | 7 | 30 | |
| Trichlorofluoromethane | ug/L | ND | 400 | 400 | 497 | 470 | 124 | 117 | 71-150 | 6 | 30 | |
| Vinyl acetate | ug/L | ND | 400 | 400 | 1650 | 1560 | 412 | 389 | 50-150 | 6 | 30 | M3 |
| Vinyl chloride | ug/L | ND | 400 | 400 | 439 | 412 | 110 | 103 | 64-150 | 6 | 30 | |
| Xylene (Total) | ug/L | ND | 1200 | 1200 | 1250 | 1240 | 104 | 103 | 75-125 | .7 | 30 | |
| 1,2-Dichloroethane-d4 (S) | % | | | | | | 107 | 100 | 75-125 | | | |
| 4-Bromofluorobenzene (S) | % | | | | | | 106 | 107 | 75-125 | | | |
| Dibromofluoromethane (S) | % | | | | | | 101 | 97 | 75-125 | | | |
| Toluene-d8 (S) | % | | | | | | 101 | 103 | 75-125 | | | |

## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

QC Batch: WET/15497 Analysis Method: SM 5220C
QC Batch Method: SM 5220C Analysis Description: SM5220C, COD - Low
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

METHOD BLANK: 592643 Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chemical Oxygen Demand | mg/L | <5.0 | 10.0 | 03/13/09 13:31 | |

LABORATORY CONTROL SAMPLE: 592644

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chemical Oxygen Demand | mg/L | 300 | 302 | 101 | 90-110 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 592645 592646

| Parameter | Units | 1090383001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chemical Oxygen Demand | mg/L | 6.2J | 50 | 50 | 58.2 | 64.0 | 104 | 116 | 90-110 | 9 | 30 | |

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## QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

QC Batch: MT/1309
Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

METHOD BLANK: 592973
Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | <0.50 | 1.0 | 03/12/09 14:15 | |
| Sulfate | mg/L | <2.5 | 5.0 | 03/12/09 14:15 | |

LABORATORY CONTROL SAMPLE: 592974

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 40 | 38.2 | 96 | 90-110 | |
| Sulfate | mg/L | 40 | 41.7 | 104 | 90-110 | |

MATRIX SPIKE SAMPLE: 592976

| Parameter | Units | 1090383004 Result | Spike Conc. | MS Result | MS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 182 | 200 | 398 | 108 | 84-124 | |
| Sulfate | mg/L | 232 | 200 | 420 | 94 | 84-124 | |

MATRIX SPIKE SAMPLE: 592977

| Parameter | Units | 1090904001 Result | Spike Conc. | MS Result | MS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|---|
| Sulfate | mg/L | 19.6 | 40 | 58.9 | 98 | 84-124 | |

SAMPLE DUPLICATE: 592975

| Parameter | Units | 1090383001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 100 | 100 | 0 | 20 | |
| Sulfate | mg/L | 336 | 334 | .9 | 20 | |

SAMPLE DUPLICATE: 592978

| Parameter | Units | 1090904001 Result | Dup Result | RPD | Max RPD | Qualifiers |
|---|---|---|---|---|---|---|
| Sulfate | mg/L | 19.6 | 19.7 | .5 | 20 | |

# QUALITY CONTROL DATA

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

QC Batch: WETA/7794
Analysis Method: SM 4500-CN-E
QC Batch Method: SM 4500-CN-E
Analysis Description: SM4500CN-E Cyanide
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

METHOD BLANK: 594822
Matrix: Water
Associated Lab Samples: 1090383001, 1090383002, 1090383003, 1090383004

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Cyanide | mg/L | <0.0050 | 0.010 | 03/20/09 09:29 | |

LABORATORY CONTROL SAMPLE: 594823

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Cyanide | mg/L | .04 | 0.038 | 96 | 80-120 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 594824 594825

| Parameter | Units | 1090383001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Max RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cyanide | mg/L | <0.0050 | .04 | .04 | 0.038 | 0.029 | 94 | 73 | 80-120 | 25 | 30 | 1M,M0 |

## QUALIFIERS

| | |
|---|---|
| Project: | Big Timber Landfill REVISED |
| Pace Project No.: | 1090383 |

**DEFINITIONS**

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

U - Indicates the compound was analyzed for, but not detected.

**LABORATORIES**

| | |
|---|---|
| PASI-G | Pace Analytical Services - Green Bay |
| PASI-M | Pace Analytical Services - Minneapolis |
| PASI-MT | Pace Analytical Services - Montana |

**ANALYTE QUALIFIERS**

| | |
|---|---|
| 1M | Sample prepped within hold time, but analyzed out of hold. |
| 2M | Sample was not received in Pace - GB LLHg Bottle. |
| 3M | Sample was recieved in a Poly Container. |
| CH | The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high. |
| CU | The continuing calibration for this compound is outside of Pace Analytical acceptance limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias. |
| H6 | Analysis initiated more than 15 minutes after sample collection. |
| M0 | Matrix spike recovery was outside laboratory control limits. |
| M3 | Matrix spike recovery was outside laboratory control limits due to matrix interferences. |
| R1 | RPD value was outside control limits. |

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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Big Timber Landfill REVISED
Pace Project No.: 1090383

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| 1090383001 | BT-1S | EPA 1631E | CVFS/1464 | EPA 1631E | CVFS/1465 |
| 1090383002 | BT-101 | EPA 1631E | CVFS/1464 | EPA 1631E | CVFS/1465 |
| 1090383003 | BT-2 | EPA 1631E | CVFS/1464 | EPA 1631E | CVFS/1465 |
| 1090383004 | BT-7 | EPA 1631E | CVFS/1464 | EPA 1631E | CVFS/1465 |
| 1090383001 | BT-1S | EPA 353.2 | MT/1239 | | |
| 1090383002 | BT-101 | EPA 353.2 | MT/1239 | | |
| 1090383003 | BT-2 | EPA 353.2 | MT/1239 | | |
| 1090383004 | BT-7 | EPA 353.2 | MT/1239 | | |
| 1090383001 | BT-1S | SM 4500-H+B | MT/1251 | | |
| 1090383002 | BT-101 | SM 4500-H+B | MT/1251 | | |
| 1090383003 | BT-2 | SM 4500-H+B | MT/1251 | | |
| 1090383004 | BT-7 | SM 4500-H+B | MT/1251 | | |
| 1090383001 | BT-1S | EPA 3020 | MPRP/14923 | EPA 6020 | ICPM/6021 |
| 1090383002 | BT-101 | EPA 3020 | MPRP/14923 | EPA 6020 | ICPM/6021 |
| 1090383003 | BT-2 | EPA 3020 | MPRP/14923 | EPA 6020 | ICPM/6021 |
| 1090383004 | BT-7 | EPA 3020 | MPRP/14923 | EPA 6020 | ICPM/6021 |
| 1090383001 | BT-1S | SM 2510B | MT/1262 | | |
| 1090383002 | BT-101 | SM 2510B | MT/1262 | | |
| 1090383003 | BT-2 | SM 2510B | MT/1262 | | |
| 1090383004 | BT-7 | SM 2510B | MT/1262 | | |
| 1090383001 | BT-1S | EPA 8260 | MSV/11860 | | |
| 1090383002 | BT-101 | EPA 8260 | MSV/11860 | | |
| 1090383003 | BT-2 | EPA 8260 | MSV/11860 | | |
| 1090383004 | BT-7 | EPA 8260 | MSV/11860 | | |
| 1090383005 | FIELD BLANK | EPA 8260 | MSV/11860 | | |
| 1090383006 | TRIP BLANK | EPA 8260 | MSV/11860 | | |
| 1090383001 | BT-1S | SM 5220C | WET/15497 | | |
| 1090383002 | BT-101 | SM 5220C | WET/15497 | | |
| 1090383003 | BT-2 | SM 5220C | WET/15497 | | |
| 1090383004 | BT-7 | SM 5220C | WET/15497 | | |
| 1090383001 | BT-1S | EPA 300.0 | MT/1309 | | |
| 1090383002 | BT-101 | EPA 300.0 | MT/1309 | | |
| 1090383003 | BT-2 | EPA 300.0 | MT/1309 | | |
| 1090383004 | BT-7 | EPA 300.0 | MT/1309 | | |
| 1090383001 | BT-1S | SM 4500-CN-E | WETA/7794 | | |
| 1090383002 | BT-101 | SM 4500-CN-E | WETA/7794 | | |
| 1090383003 | BT-2 | SM 4500-CN-E | WETA/7794 | | |
| 1090383004 | BT-7 | SM 4500-CN-E | WETA/7794 | | |

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www.pacelabs.com

# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

✓ CAC 3.4

1090383

Page: of

1261807

**Section A**
**Required** Client Information:

Company: Tetra Tech
Address: 618 S 25th St
Email To: jeff.rice@tetratech.com
Phone: 248-9161
Fax:
Requested Due Date/TAT:

**Section B**
**Required** Project Information:

Report To: Jeff Rice
Copy To:
Purchase Order No.:
Project Name: Big Timber Landfill
Project Number:

**Section C**
Invoice Information:

Attention:
Company Name: Tetra Tech
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

**REGULATORY AGENCY**

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ________

Site Location
STATE: MT

**Section D**
**Required** Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

| Matrix Codes MATRIX | CODE |
|---|---|
| Drinking Water | DW |
| Water | WT |
| Waste Water | WW |
| Product | P |
| Soil/Solid | SL |
| Oil | OL |
| Wipe | WP |
| Air | AR |
| Tissue | TS |
| Other | OT |

Requested Analysis Filtered (Y/N)

| ITEM # | SAMPLE ID | MATRIX CODE (see valid codes to left) | SAMPLE TYPE (G=GRAB C=COMP) | COLLECTED COMPOSITE START DATE | COLLECTED COMPOSITE START TIME | COLLECTED COMPOSITE END/GRAB DATE | COLLECTED COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ Sulfuric (2) | $HNO_3$ Nitric | HCl | NaOH Sodium Hydroxide | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | VOC's | cyanide | Dis metals | ~~nitrate nitrite~~ | Common Ions | nutrients | LANDFILL samples | Residual Chlorine (Y/N) | Pace Project No./Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BT-15 | W | G | 3-3 | | 3-3 | 1300 | | | | | | | | | | | | X | X | X | | X | X | | | 001 |
| 2 | BT-101 | W | G | 3-3 | | 3-3 | 1300 | | | | | | | | | | | | X | X | X | | X | X | | | 002 |
| 3 | BT-2 | W | G | 3-3 | | 3-3 | 1350 | | | | | | | | | | | | X | X | X | | X | X | | | 003 |
| 4 | ~~BT-6~~ | W | G | ~~3-3~~ | | | | | | | | | | | | | | | | | | | | | | | 004 |
| 5 | BT-7 | W | G | 3-3 | | 3-3 | 1425 | | | | | | | | | | | | X | X | X | | X | X | | | 005 |
| 6 | Field Blank | W | G | 3-3 | | 3-3 | 1440 | | | | | | | | | | | | X | | | | | | | | 006 |
| 7 | Trip Blank | W | G | 3-27 | | 2-27 | 0840 | | | | | | | | | | | | X | | | | | | | | HOLD 007 |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| ADDITIONAL COMMENTS | RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME |
|---|---|---|---|---|---|---|
| Hold Trip blank unless feild blank fails. | Ryan | 3-3-09 | 1700 | Sally Hoppe | 3/3/09 | 1700 |

SAMPLE CONDITIONS

| Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
|---|---|---|---|
| 4.0 | Y | N | Y |

ORIGINAL

**SAMPLER NAME AND SIGNATURE**

PRINT Name of SAMPLER: Ryan Sparhawk
SIGNATURE of SAMPLER:
DATE Signed (MM/DD/YY): 3-3-2009

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5%

# Sample Condition Upon Receipt

Pace Analytical

Client Name: R Billings  Project # 1090383

**Courier:** ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace Other ______

**Tracking #:** ______

Optional
Proj. Due Date:
Proj. Name:

**Custody Seal on Cooler/Box Present:** ☐ yes ☒ no  Seals intact: ☐ yes ☒ no

**Packing Material:** ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other ______ Temp Blank: Yes ____ No X

**Thermometer Used** 135  **Type of Ice:** [✓ Wet] Blue None ☒ Samples on ice, cooling process has begun

**Cooler Temperature** 4.0  **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

**Date and Initials of person examining contents:** SH 3/4/09

**Comments:**

| | | | | |
|---|---|---|---|---|
| Chain of Custody Present: | ☒Yes | ☐No | ☐N/A | 1. |
| Chain of Custody Filled Out: | ☒Yes | ☐No | ☐N/A | 2. |
| Chain of Custody Relinquished: | ☒Yes | ☐No | ☐N/A | 3. |
| Sampler Name & Signature on COC: | ☒Yes | ☐No | ☐N/A | 4. |
| Samples Arrived within Hold Time: | ☒Yes | ☐No | ☐N/A | 5. |
| **Short Hold Time Analysis (<72hr):** | ☐Yes | ☒No | ☐N/A | 6. |
| **Rush Turn Around Time Requested:** | ☐Yes | ☒No | ☐N/A | 7. |
| Sufficient Volume: | ☒Yes | ☐No | ☐N/A | 8. |
| Correct Containers Used: | ☒Yes | ☐No | ☐N/A | 9. |
| -Pace Containers Used: | ☒Yes | ☐No | ☐N/A | |
| Containers Intact: | ☒Yes | ☐No | ☐N/A | 10. |
| Filtered volume received for Dissolved tests | ☒Yes | ☐No | ☐N/A | 11. |
| Sample Labels match COC: | ☒Yes | ☐No | ☐N/A | 12. |
| -Includes date/time/ID/Analysis Matrix: H2O | | | | |
| All containers needing acid/base preservation have been checked. Noncompliance are noted in 13. | ☒Yes | ☐No | ☐N/A | 13. |
| All containers needing preservation are found to be in compliance with EPA recommendation. | ☒Yes | ☐No | ☐N/A | |
| Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water) | ☒Yes | ☐No | | Initial when completed SH / Lot # of added preservative |
| Samples checked for dechlorination: | ☐Yes | ☐No | ☒N/A | 14. |
| Headspace in VOA Vials ( >6mm): | ☐Yes | ☒No | ☐N/A | 15. |
| Trip Blank Present: | ☒Yes | ☐No | ☐N/A | 16. |
| Trip Blank Custody Seals Present | ☒Yes | ☐No | ☐N/A | |
| Pace Trip Blank Lot # (if purchased): NA | | | | |

**Client Notification/ Resolution:**  Field Data Required? Y / N

Person Contacted: ______ Date/Time: ______

Comments/ Resolution: ______

Project Manager Review: ______  Date: 3-4-09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office ( i.e out of hold, incorrect preservative, out of temp, incorrect containers)

# Appendix D

# Summary of Laboratory Data

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-1S
## Project No. 9731053

| Sample Date | 10/5/1994 | 4/28/1995 | 1/16/1996 | 10/8/1996 | 4/29/1997 | 12/10/1997 | 11/19/1998 | 5/6/1999 | 10/20/1999 | 4/25/2000 | 10/18/2000 | 10/21/2001 | 5/11/2007 | 3/3/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | 9.8 | 9.5 | 10.2 | 9.3 | 55.7 | 9.5 | 10.1 | 11 | 10.9 | 11.9 | 10.6 | 10.9 | 10.6 | 15.7 |
| **Field pH, S.U.** | 8.0 | 7.5 | 7.7 | 7.4 | 7.9 | 6.8 | 7.8 | 7.9 | 7.7 | 7.5 | 8.6 | 9.2 | 7.4 | 7.3 |
| **Field SC, µS** | 1225 | 1233 | 1190 | 1250 | 1570 | 1150 | 1177 | 877 | 1246 | 890 | 3974 | 540 | 1502 | 1158 |
|  | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results |
| ***Parameter*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Chloride as Cl, mg/l | 71 | 110 | 131 | 143 | 137 | 139 | 136 | 130 | 130 | 129 | 51 | 50 | 104 | 100 |
| Sulfate as SO4, mg/l | 190 | 361 | 334 | 434 | 412 | 418 | 393 | 352 | 365 | 334 | 125 | 102 | 325 | 336 |
| Chemical Oxygen Demand, mg/l | 6 | 27 | 12 | 17 | 45 | 9 | 15 | 7 | 14 | 10 | <5 | 10 | 15 | 6.2 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1040 | 1400 | 1520 | 1680 | 1700 | 1680 | 1730 | 1730 | 1600 | 1420 | 538 | 494 | 1380 | 1350 |
| pH, S.U. | 7.7 | 7.7 | 7.8 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.8 | 7.6 | 8.6 | 9.1 | 8.8 | 7.9 |
| Antimony as Sb (Dissolved), mg/l | 0.006 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic as As (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | 0.04 | <0.02 | <0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | <0.02 | <0.02 | <0.02 | 0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.001 |
| Chromium as Cr (Dissolved), mg/l | 0.003 | <0.002 | <0.002 | <0.002 | <0.002 | 0.004 | 0.003 | 0.004 | 0.004 | 0.012 | <0.001 | <0.001 | 0.002 | 0.002 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | 0.004 | 0.003 | <0.001 | 0.001 | 0.001 | 0.002 | <0.001 | 0.001 | 0.002 | <0.001 | <0.001 | 0.002 | 0.001 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.33 | <0.05 | <0.05 | <0.025 |
| Lead as Pb (Dissolved), mg/l | 0.002 | <0.002 | <0.002 | <0.001 | 0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.001 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | 0.009 | <0.005 | <0.005 | <0.005 | <0.005 | 0.018 | 0.020 | 0.014 | 0.039 | <0.005 | <0.005 | 0.01 | 0.009 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0005 | <0.0005 | <0.0005 | <0.0003 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 | <0.001 | <0.0002 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.18 | <0.01 | <0.01 |

**Notes:** SC= Specific Conductance °C = Degrees Celsius S.U. = Standard Units mg/L = Milligrams per liter µS = microsiemens

3/3/2009 data censored to lowest previous detection limit. Actual concentrations are reported on Table 1

N:\TYPING\ENV-FAC\9731053\Post Closure March 2009\Summary lab data.xls

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-101S
### Project No. 9731053

| Sample Date | 1/16/1996 | 10/8/1996 | 12/10/1997 | 11/19/1998 | 5/6/1999 | 10/20/1999 | 4/25/2000 | 10/18/2000 | 4/27/2001 | 5/11/2007 | 3/3/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **10.2** | **9.3** | **9.5** | **10.1** | **11** | **10.9** | **11.9** | **10.6** | **10.9** | **10.6** | **15.7** |
| **Field pH, S.U.** | **7.7** | **7.4** | **6.8** | **7.8** | **7.9** | **7.7** | **7.5** | **8.6** | **9.2** | **7.4** | **7.3** |
| **Field SC, µS** | **1190** | **1250** | **1150** | **1177** | **877** | **1246** | **890** | **3974** | **540** | **1502** | **1158** |
|  | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** |
| ***Parameter*** |  |  |  |  |  |  |  |  |  |  |  |
| Chloride as Cl, mg/l | 131 | 138 | 137 | 134 | 140 | 126 | 129 | 61 | 48 | 102 | 99.5 |
| Sulfate as SO4, mg/l | 327 | 431 | 416 | 397 | 360 | 370 | 337 | 142 | 109 | 322 | 331 |
| Chemical Oxygen Demand, mg/l | 11 | 18 | 14 | 16 | 7 | 10 | 12 | 7 | <5 | 24 | <5 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1510 | 1710 | 1690 | 1730 | 1730 | 1590 | 1410 | 583 | 507 | 1380 | 1310 |
| pH, S.U. | 7.8 | 7.7 | 7.7 | 7.7 | 7.8 | 7.8 | 7.6 | 8.7 | 9.1 | 7.8 | 7.9 |
| Antimony as Sb (Dissolved), mg/l | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic as As (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | <0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | <0.02 | <0.02 | 0.02 | 0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.001 |
| Chromium as Cr (Dissolved), mg/l | <0.002 | <0.002 | 0.006 | 0.003 | 0.004 | 0.005 | 0.017 | <0.001 | 0.002 | 0.002 | 0.002 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | <0.001 | 0.001 | 0.002 | 0.001 | 0.002 | 0.013 | <0.001 | <0.001 | 0.008 | 0.001 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.025 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.001 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | 0.018 | 0.018 | 0.018 | 0.041 | <0.005 | <0.005 | 0.011 | 0.009 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.001 | <0.0005 | <0.0005 | <0.0005 | <0.0003 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 | <0.01 |

**Notes:** SC= Specific Conductance °C = Degrees Celsius S.U. = Standard Units mg/L = Milligrams per liter µS = microsiemens

3/3/2009 data censored to lowest previous detection limit. Actual concentrations are reported on Table 1

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-2
### Project No. 9731053

| **Sample Date** | **10/5/1994** | **4/28/1995** | **1/16/1996** | **10/8/1996** | **4/29/1997** | **12/10/1997** | **11/19/1998** | **5/6/1999** | **10/20/1999** | **4/25/2000** | **10/18/2000** | **4/27/2001** | **5/11/2007** | **3/3/2009** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **9.7** | **9.9** | **10.0** | **9.4** | **51.4** | **9.5** | **10.3** | **11** | **11** | **12.2** | **10.6** | **11** | **10.6** | **15.9** |
| **Field pH, S.U.** | **9.1** | **8.3** | **8.7** | **8.1** | **8.2** | **7.6** | **9.0** | **9.0** | **8.8** | **8.5** | **8.6** | **8.8** | **8.0** | **7.7** |
| **Field SC, µS** | **522** | **466** | **446** | **428** | **559** | **360** | **385** | **293** | **405** | **317** | **397** | **580** | **652** | **570** |
| | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** |
| ***Parameter*** | | | | | | | | | | | | | | |
| Chloride as Cl, mg/l | 39 | 32 | 28 | 30 | 28 | 31 | 31 | 26 | 26 | 27 | 24 | 33 | 45 | 32 |
| Sulfate as SO4, mg/l | 174 | 161 | 146 | 156 | 164 | 147 | 153 | 140 | 152 | 150 | 142 | 140 | 152 | 145 |
| Chemical Oxygen Demand, mg/l | 37 | 13 | 46 | 10 | 10 | 8 | 17 | 6 | 36 | 19 | 14 | <5 | 14 | <5 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 566 | 450 | 511 | 533 | 549 | 534 | 535 | 539 | 478 | 459 | 471 | 530 | 606 | 524 |
| pH, S.U. | 8.2 | 8.0 | 8.1 | 8.7 | 8.6 | 8.6 | 8.7 | 8.6 | 8.7 | 8.6 | 8.5 | 8.8 | 8.6 | 8.3 |
| Antimony as Sb (Dissolved), mg/l | 0.009 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 |
| Arsenic as As (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | 0.03 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium as Cr (Dissolved), mg/l | <0.002 | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | 0.010 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.018 | <0.001 | 0.003 | <0.001 | <0.001 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | 0.11 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.001 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0016 | <0.0005 | <0.0005 | <0.0005 | <0.0002 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 | <0.001 | <0.0003 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | 0.04 | <0.01 | <0.01 |

**Notes:** SC= Specific Conductance °C = Degrees Celsius S.U. = Standard Units mg/L = Milligrams per liter µS = microsiemens

3/3/2009 data censored to lowest previous detection limit. Actual concentrations are reported on Table 1

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-3
### Project No. 9731053

| **Sample Date** | **10/4/1994** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **10.4** | | | | | | | | | | |
| **Field pH, S.U.** | **7.7** | | | | | | | | | | |
| **Field SC, µS** | **1252** | | | | | | | | | | |
| | **Lab Results** | | | | | | | | | | |
| ***Parameter*** | | | | | | | | | | | |
| Chloride as Cl, mg/l | 153 | | | | | | | | | | |
| Sulfate as SO4, mg/l | 267 | | | | | | | | | | |
| Chemical Oxygen Demand, mg/l | 7 | | | | | | | | | | |
| Cyanide as CN (Total), mg/l | <0.005 | | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 1450 | | | | | | | | | | |
| pH, S.U. | 7.5 | | | | | | | | | | |
| Antimony as Sb (Dissolved), mg/l | 0.006 | | | | | | | | | | |
| Arsenic as As (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Barium as Ba (Dissolved), mg/l | 0.05 | | | | | | | | | | |
| Beryllium as Be (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | | | | | | | | | | |
| Chromium as Cr (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Cobalt as Co (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Copper as Cu (Dissolved), mg/l | <0.001 | | | | | | | | | | |
| Iron as Fe (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Lead as Pb (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Nickel as Ni (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Selenium as Se (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Silver as Ag (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Thallium as Tl (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Vanadium as V (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Zinc as Zn (Dissolved), mg/l | <0.02 | | | | | | | | | | |

**Notes:** SC= Specific Conductance °C = Degrees Celsius S.U. = Standard Units mg/L = Milligrams per liter µS = microsiemens

3/3/2009 data censored to lowest previous detection limit. Actual concentrations are reported on Table 1

## BIG TIMBER LANDFILL
## BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-4
## Project No. 9731053

| **Sample Date** | **10/5/1994** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **9.6** | | | | | | | | | | |
| **Field pH, S.U.** | **7.9** | | | | | | | | | | |
| **Field SC, µS** | **928** | | | | | | | | | | |
| | **Lab Results** | | | | | | | | | | |
| ***Parameter*** | | | | | | | | | | | |
| Chloride as Cl, mg/l | 71 | | | | | | | | | | |
| Sulfate as SO4, mg/l | 190 | | | | | | | | | | |
| Chemical Oxygen Demand, mg/l | 6 | | | | | | | | | | |
| Cyanide as CN (Total), mg/l | <0.005 | | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 1040 | | | | | | | | | | |
| pH, S.U. | 7.7 | | | | | | | | | | |
| Antimony as Sb (Dissolved), mg/l | 0.006 | | | | | | | | | | |
| Arsenic as As (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Barium as Ba (Dissolved), mg/l | 0.04 | | | | | | | | | | |
| Beryllium as Be (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | | | | | | | | | | |
| Chromium as Cr (Dissolved), mg/l | 0.003 | | | | | | | | | | |
| Cobalt as Co (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Copper as Cu (Dissolved), mg/l | 0.002 | | | | | | | | | | |
| Iron as Fe (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Lead as Pb (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Nickel as Ni (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Selenium as Se (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Silver as Ag (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Thallium as Tl (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Vanadium as V (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Zinc as Zn (Dissolved), mg/l | <0.02 | | | | | | | | | | |

**Notes:** SC= Specific Conductance °C = Degrees Celsius S.U. = Standard Units mg/L = Milligrams per liter µS = microsiemens

3/3/2009 data censored to lowest previous detection limit. Actual concentrations are reported on Table 1

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-5
### Project No. 9731053

| **Sample Date** | **10/5/1994** |
|---|---|
| **Temperature, °C** | **9.6** |
| **Field pH, S.U.** | **7.9** |
| **Field SC, µS** | **928** |
| | **Lab Results** |
| ***Parameter*** | |
| Chloride as Cl, mg/l | 131 |
| Sulfate as SO4, mg/l | 172 |
| Chemical Oxygen Demand, mg/l | 6 |
| Cyanide as CN (Total), mg/l | <0.005 |
| Electrical Conductivity, umhos/cm | 1050 |
| pH, S.U. | 7.8 |
| Antimony as Sb (Dissolved), mg/l | 0.006 |
| Arsenic as As (Dissolved), mg/l | <0.005 |
| Barium as Ba (Dissolved), mg/l | 0.04 |
| Beryllium as Be (Dissolved), mg/l | <0.002 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 |
| Chromium as Cr (Dissolved), mg/l | <0.002 |
| Cobalt as Co (Dissolved), mg/l | <0.005 |
| Copper as Cu (Dissolved), mg/l | 0.003 |
| Iron as Fe (Dissolved), mg/l | <0.05 |
| Lead as Pb (Dissolved), mg/l | <0.002 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 |
| Selenium as Se (Dissolved), mg/l | <0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 |
| Thallium as Tl (Dissolved), mg/l | <0.002 |
| Vanadium as V (Dissolved), mg/l | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 |

**Notes:** SC= Specific Conductance °C = Degrees Celsius S.U. = Standard Units mg/L = Milligrams per liter µS = microsiemens

3/3/2009 data censored to lowest previous detection limit. Actual concentrations are reported on Table 1

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-6
## Project No. 9731053

| Sample Date | 10/4/1994 | 4/28/1995 | 1/16/1996 | 10/8/1996 | 4/29/1997 | 12/10/1997 | 11/19/1998 | 5/6/1999 | 10/20/1999 | 4/25/2000 | 10/18/2000 | 4/27/2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | 11.2 | 9.3 | 10.1 | 9.9 | 59 | NA | 9.9 | NA | 11.3 | 11.9 | 10.3 | 12.9 |
| **Field pH, S.U.** | 9.0 | 8.2 | 8.5 | 7.9 | 8.7 | NA | 9.2 | NA | 8.2 | 7.3 | 7.6 | 8.2 |
| **Field SC, µS** | 950 | 746 | 568 | 612 | 628 | NA | 403 | NA | 435 | 342 | 406 | 638 |
| | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results |
| ***Parameter*** | | | | | | | | | | | | |
| Chloride as Cl, mg/l | 153 | 74 | 63 | 74 | 58 | 64 | 56 | 53 | 51 | 56 | 57 | 60 |
| Sulfate as SO4, mg/l | 267 | 258 | 174 | 306 | 137 | 117 | 108 | 93 | 96 | 98 | 114 | 108 |
| Chemical Oxygen Demand, mg/l | 7 | 3 | 43 | 24 | 204 | 18 | 9 | <5 | 30 | 21 | 40 | 16 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1460 | 789 | 586 | 914 | 599 | 621 | 568 | 556 | 502 | 472 | 548 | 566 |
| pH, S.U. | 7.5 | 7.7 | 8.2 | 8.6 | 8.6 | 8.2 | 8.5 | 8.6 | 8.5 | 8.6 | 8,5 | 8.3 |
| Antimony as Sb (Dissolved), mg/l | 0.008 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | 0.005 | <0.003 | <0.003 |
| Arsenic as As (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | 0.06 | 0.02 | <0.02 | 0.04 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0002 |
| Chromium as Cr (Dissolved), mg/l | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | 0.003 | <0.001 | 0.008 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.003 | 0.004 | <0.001 | 0.002 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | 0.08 | <0.05 | 0.09 | <0.05 | <0.05 | <0.05 | 0.05 | <0.05 | <0.05 | 0.86 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.011 | <0.005 | <0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0024 | <0.0005 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.06 | <0.02 | <0.02 |

**Notes:** SC= Specific Conductance °C = Degrees Celsius S.U. = Standard Units mg/L = Milligrams per liter µS = microsiemens

3/3/2009 data censored to lowest previous detection limit. Actual concentrations are reported on Table 1

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-7
### Project No. 9731053

| **Sample Date** | **1/16/1999** | **10/8/1996** | **4/29/1997** | **12/10/1997** | **11/19/1998** | **5/6/1999** | **10/20/1999** | **4/25/2000** | **10/18/2000** | **4/27/2001** | **511/2007** | **3/3/2009** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **10** | **10.9** | **54.2** | **9** | **10.3** | **11.6** | **11.5** | **12.6** | **11.1** | **12** | **11.3** | **15.6** |
| **Field pH, S.U.** | **7.2** | **7.4** | **7.4** |  | **7.8** | **7.8** | **7.7** | **7.5** | **7.6** | **7.7** | **7.3** | **6.5** |
| **Field SC, µS** | **1053** | **948** | **121** | **875** | **886** | **693** | **941** | **755** | **941** | **1310** | **1384** | **1068** |
|  | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** |
| ***Parameter*** |  |  |  |  |  |  |  |  |  |  |  |  |
| Chloride as Cl, mg/l | 175 | 170 | 177 | 170 | 155 | 160 | 150 | 172 | 169 | 179 | 170 | 182 |
| Sulfate as SO4, mg/l | 218 | 237 | 226 | 219 | 226 | 220 | 227 | 231 | 225 | 227 | 233 | 232 |
| Chemical Oxygen Demand, mg/l | 20 | 29 | 57 | 21 | 24 | 24 | 21 | 10 | 12 | 8 | 29 | <5 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1340 | 1250 | 1300 | 1260 | 1290 | 1320 | 1240 | 1170 | 1220 | 1270 | 1290 | 1250 |
| pH, S.U. | 7.3 | 7.6 | 7.7 | 7.7 | 7.7 | 7.8 | 7.8 | 7.6 | 7.7 | 7.6 | 7.6 | 7.7 |
| Antimony as Sb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 |
| Arsenic as As (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | 0.07 | 0.05 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.001 |
| Chromium as Cr (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | 0.002 | <0.001 | <0.001 | <0.001 | 0.005 | <0.001 | 0.003 | <0.001 | 0.002 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.036 | <0.001 | 0.003 | 0.002 | 0.001 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.06 | 0.06 | <0.05 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.001 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.001 | <0.001 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.012 | <0.005 | 0.005 | 0.007 | 0.008 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0033 | <0.0005 | <0.0005 | <0.0005 | <0.0002 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 | <0.001 | <0.0003 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.04 | <0.01 | <0.01 |

**Notes:** SC= Specific Conductance °C = Degrees Celsius S.U. = Standard Units mg/L = Milligrams per liter µS = microsiemens

3/3/2009 data censored to lowest previous detection limit. Actual concentrations are reported on Table 1

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# Appendix E

# Laboratory Quality Control Summary

# Laboratory Quality Control Summary

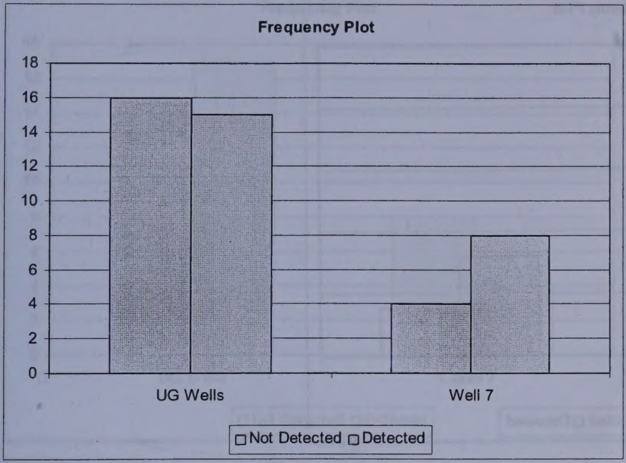
| Analyte | Date of Analysis | Blank | LCS / LCSD % | MS/MSD % | RPD % |
|---|---|---|---|---|---|
| Chloride (300.0) | 3/12/09 | <0.5 mg/l | 96 | 108 / --[2] | 0[5] |
| Sulfate (300.0) | 3/12/09 | <2.5 mg/l | 104 | 94 / --[2] | 0.9[5] |
| COD (5220C) | 3/13/09 | <5 mg/l | 101 | 104 / 116[5] | 9[5] |
| Cyanide (4500CNE) | 3/20/09 | <0.005 mg/l | 96 | 94 / 73*[5] | 25[5] |
| EC (2510B) | 3/6/09 | <5 umhos/cm | 98 | NA | 2[5] |
| Nitrate + Nitrite (353.2) | 3/10/09 | <0.005 mg/l | 99 / -- | 90 / --[3] | 4[4] |
| pH (4500 –H+B) | 3/4/09 | NA | 101 | NA | 0[3] |
| Antimony (6020) | 3/5/09 | <0.00005 mg/l | 101 | 105 / 106[5] | 1[5] |
| Arsenic (6020) | 3/5/09 | <0.00025 mg/l | 99 | 107 / 104[5] | 3[5] |
| Barium (6020) | 3/5/09 | 0.0002 J mg/l | 97 | 98 / 96[5] | 2[5] |
| Beryllium (6020) | 3/5/09 | <0.0001 mg/l | 88 | 95 / 82[5] | 15[5] |
| Cadmium (6020) | 3/5/09 | <0.0004 mg/l | 97 | 99 / 96[5] | 3[5] |
| Chromium (6020) | 3/5/09 | <0.00025 mg/l | 96 | 95 / 93[5] | 3[5] |
| Cobalt (6020) | 3/5/09 | <0.00025 mg/l | 92 | 96 / 94[5] | 2[5] |
| Copper (6020) | 3/5/09 | <0.00025 mg/l | 94 | 94 / 92[5] | 2[5] |
| Iron (6020) | 3/5/09 | <0.025 mg/l | 100 | 96 / 94[5] | 2[5] |
| Lead (6020) | 3/5/09 | <0.00005 mg/l | 101 | 94 / 90[5] | 4[5] |
| Mercury (1631E) | 3/11/09 | 0.188 J ng/l | 101 / 95 | 92 / 109[1]<br>108 / 109[2] | 12[1]<br>0.8[2] |
| Nickel (6020) | 3/5/09 | <0.00025 mg/l | 89 | 92 / 88[5] | 3[5] |
| Selenium (6020) | 3/5/09 | <0.00025 mg/l | 97 | 104 / 101[5] | 3[5] |
| Silver (6020) | 3/5/09 | 0.00027 J mg/l | 93 | 91 / 89[5] | 2[5] |
| Thallium (6020) | 3/5/09 | <0.00025 mg/l | 100 | 97 / 92[5] | 5[5] |
| Vanadium (6020) | 3/5/09 | <0.00005 mg/l | 92 | 93 / 90[5] | 3[5] |
| Zinc (6020) | 3/5/09 | <0.0025 mg/l | 95 | 95 / 92[5] | 3[5] |
| VOCs (8260) | 3/6/09 | All < MDL | All within limits 85-118% | See footnote[6] | 0.05-34[6] |

[1] QC analysis of BT-2
[2] QC analysis of BT-7
[3] QC analysis of a non-project sample
[4] QC analysis of BT-101
[5] QC analysis of BT-1S
[6] MS/MSD performed on a non-project sample. MS/MSD recoveries within limits except vinyl acetate with recoveries above QC limits. RPDs between MS/MSD within limits except carbon disulfide at 34%.
* The recovery is outside the quality control limits

# Appendix F

# Statistical Evaluation Worksheets

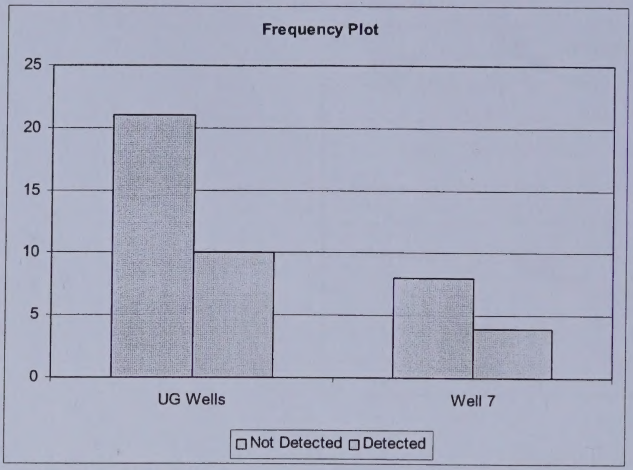
**Barium, Upgradient Wells vs. BT-07**



| | Descriptive Statistics (CT_BA.sta) | | | | | |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Ba UG | 31 | 0.026774 | 0.020000 | 0.020000 | 0.080000 | 0.012487 |
| Ba 7 | 12 | 0.032500 | 0.030000 | 0.020000 | 0.070000 | 0.014848 |

| | 2 x 2 Table (CT_BA.sta) | | |
|---|---|---|---|
| | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 16 | 4 | 20 |
| Percent of total | 37.209% | 9.302% | 46.512% |
| Frequencies, row 2 | 15 | 8 | 23 |
| Percent of total | 34.884% | 18.605% | 53.488% |
| Column totals | 31 | 12 | 43 |
| Percent of total | 72.093% | 27.907% | |
| Chi-square (df=1) | 1.16 | p= .2811 | |
| V-square (df=1) | 1.13 | p= .2867 | |
| Yates corrected Chi-square | .54 | p= .4611 | |
| Phi-square | .02702 | | |
| Fisher exact p, one-tailed | | p= .2316 | |
| two-tailed | | p= .3271 | |
| McNemar Chi-square (A/D) | 2.04 | p= .1531 | |
| Chi-square (B/C) | 5.26 | p= .0218 | |

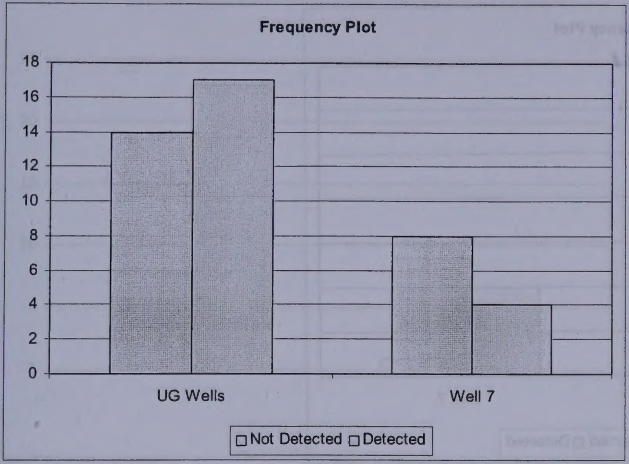
**Chromium, Upgradient Wells vs. BT-07**



| | Descriptive Statistics (CT_CR.sta) | | | | | |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Cr UG | 31 | 0.002548 | 0.002000 | 0.001000 | 0.012000 | 0.002434 |
| Cr 7 | 12 | 0.001917 | 0.002000 | 0.001000 | 0.005000 | 0.001165 |

| | 2 x 2 Table (CT_CR.sta) | | |
|---|---|---|---|
| | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 21 | 8 | 29 |
| Percent of total | 48.837% | 18.605% | 67.442% |
| Frequencies, row 2 | 10 | 4 | 14 |
| Percent of total | 23.256% | 9.302% | 32.558% |
| Column totals | 31 | 12 | 43 |
| Percent of total | 72.093% | 27.907% | |
| Chi-square (df=1) | .00 | p= .9462 | |
| V-square (df=1) | .00 | p= .9468 | |
| Yates corrected Chi-square | .09 | p= .7678 | |
| Phi-square | .00011 | | |
| Fisher exact p, one-tailed | | p= .6085 | |
| two-tailed | | p=1.0000 | |
| McNemar Chi-square (A/D) | 10.24 | p= .0014 | |
| Chi-square (B/C) | .06 | p= .8137 | |

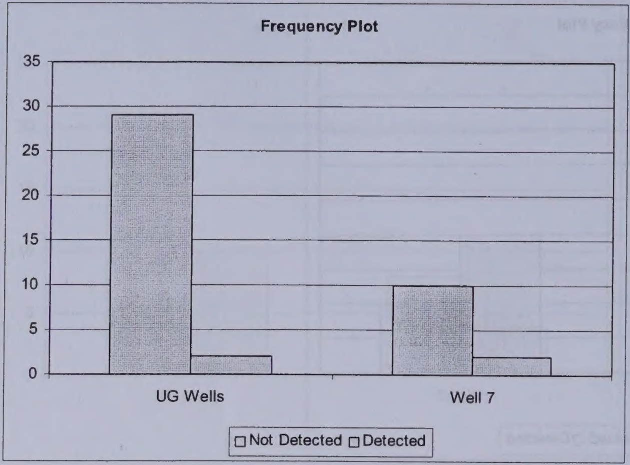
**Copper, Upgradient Wells vs. BT-07**



| Variable | Descriptive Statistics (CT_CU.sta)<br>Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| Cu UG | 31 | 0.002355 | 0.001000 | 0.001000 | 0.018000 | 0.003261 |
| Cu 7 | 12 | 0.004167 | 0.001000 | 0.001000 | 0.036000 | 0.010044 |

|  | 2 x 2 Table (CT_CU.sta)<br>Column 1 | Column 2 | Row Totals |
|---|---|---|---|
| Frequencies, row 1 | 14 | 8 | 22 |
| Percent of total | 32.558% | 18.605% | 51.163% |
| Frequencies, row 2 | 17 | 4 | 21 |
| Percent of total | 39.535% | 9.302% | 48.837% |
| Column totals | 31 | 12 | 43 |
| Percent of total | 72.093% | 27.907% |  |
| Chi-square (df=1) | 1.60 | p= .2057 |  |
| V-square (df=1) | 1.56 | p= .2111 |  |
| Yates corrected Chi-square | .86 | p= .3548 |  |
| Phi-square | .03724 |  |  |
| Fisher exact p, one-tailed |  | p= .1778 |  |
| two-tailed |  | p= .3102 |  |
| McNemar Chi-square (A/D) | 4.50 | p= .0339 |  |
| Chi-square (B/C) | 2.56 | p= .1096 |  |

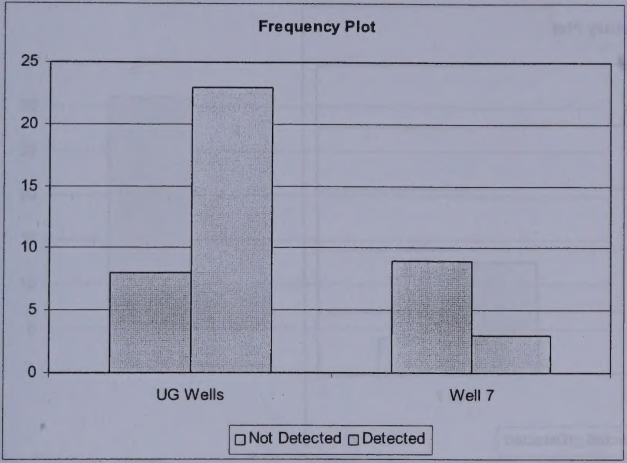
**Iron, Upgradient Wells vs. BT-07**



| | Descriptive Statistics (CT_FE.sta) | | | | | |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Fe UG | 31 | 0.060161 | 0.050000 | 0.025000 | 0.330000 | 0.051454 |
| Fe 7 | 12 | 0.050833 | 0.050000 | 0.050000 | 0.060000 | 0.002887 |

| | 2 x 2 Table (CT_FE.sta) | | |
|---|---|---|---|
| | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 29 | 10 | 39 |
| Percent of total | 67.442% | 23.256% | 90.698% |
| Frequencies, row 2 | 2 | 2 | 4 |
| Percent of total | 4.651% | 4.651% | 9.302% |
| Column totals | 31 | 12 | 43 |
| Percent of total | 72.093% | 27.907% | |
| Chi-square (df=1) | 1.07 | p= .3010 | |
| V-square (df=1) | 1.05 | p= .3067 | |
| Yates corrected Chi-square | .20 | p= .6533 | |
| Phi-square | .02488 | | |
| Fisher exact p, one-tailed | | p= .3080 | |
| two-tailed | | p= .3080 | |
| McNemar Chi-square (A/D) | 21.81 | p= .0000 | |
| Chi-square (B/C) | 4.08 | p= .0433 | |

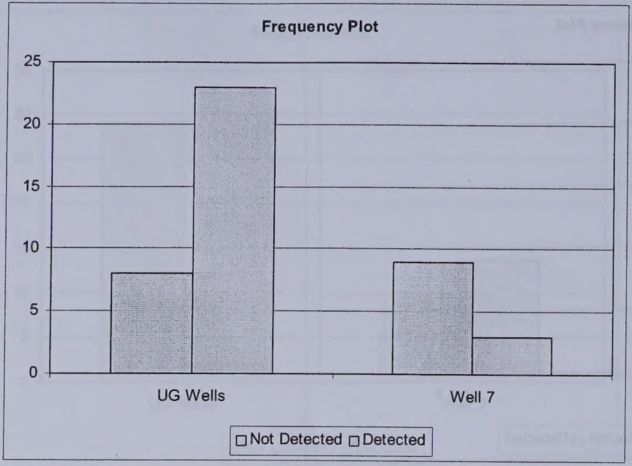
**Selenium, Upgradient Wells vs. BT-07**



| | Descriptive Statistics (CT_SE.sta) | | | | | |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Se UG | 31 | 0.007742 | 0.005000 | 0.005000 | 0.039000 | 0.006966 |
| Se 7 | 12 | 0.006000 | 0.005000 | 0.005000 | 0.012000 | 0.002132 |

| | 2 x 2 Table (CT_SE.sta) | | |
|---|---|---|---|
| | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 8 | 9 | 17 |
| Percent of total | 18.605% | 20.930% | 39.535% |
| Frequencies, row 2 | 23 | 3 | 26 |
| Percent of total | 53.488% | 6.977% | 60.465% |
| Column totals | 31 | 12 | 43 |
| Percent of total | 72.093% | 27.907% | |
| Chi-square (df=1) | 8.76 | p= .0031 | |
| V-square (df=1) | 8.55 | p= .0034 | |
| Yates corrected Chi-square | 6.82 | p= .0090 | |
| Phi-square | .20367 | | |
| Fisher exact p, one-tailed | | p= .0046 | |
| two-tailed | | p= .0052 | |
| McNemar Chi-square (A/D) | 1.45 | p= .2278 | |
| Chi-square (B/C) | 5.28 | p= .0216 | |

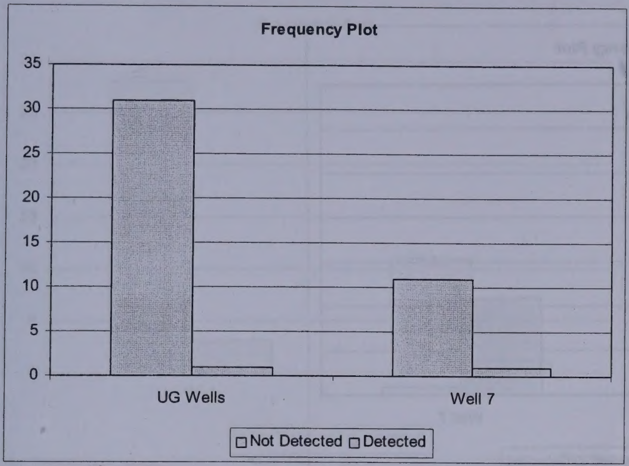
**Selenium, Upgradient Wells vs. BT-07**



|  | Descriptive Statistics (CT_SE.sta) |  |  |  |  |  |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Se UG | 31 | 0.007742 | 0.005000 | 0.005000 | 0.039000 | 0.006966 |
| Se 7 | 12 | 0.006000 | 0.005000 | 0.005000 | 0.012000 | 0.002132 |

|  | 2 x 2 Table (CT_SE.sta) |  |  |
|---|---|---|---|
|  | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 8 | 9 | 17 |
| Percent of total | 18.605% | 20.930% | 39.535% |
| Frequencies, row 2 | 23 | 3 | 26 |
| Percent of total | 53.488% | 6.977% | 60.465% |
| Column totals | 31 | 12 | 43 |
| Percent of total | 72.093% | 27.907% |  |
| Chi-square (df=1) | 8.76 | p= .0031 |  |
| V-square (df=1) | 8.55 | p= .0034 |  |
| Yates corrected Chi-square | 6.82 | p= .0090 |  |
| Phi-square | .20367 |  |  |
| Fisher exact p, one-tailed |  | p= .0046 |  |
| two-tailed |  | p= .0052 |  |
| McNemar Chi-square (A/D) | 1.45 | p= .2278 |  |
| Chi-square (B/C) | 5.28 | p= .0216 |  |

**Silver, Upgradient Wells vs BT-7**



| | Descriptive Statistics (PS_AG.sta) | | | | | |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Ag UG | 31 | 0.183871 | 0.100000 | 0.100000 | 1.600000 | 0.270304 |
| Ag 7 | 12 | 0.404167 | 0.100000 | 0.100000 | 3.300000 | 0.914395 |

***Poisson Prediciton Limit***

Upgradient Wells vs. BT 7

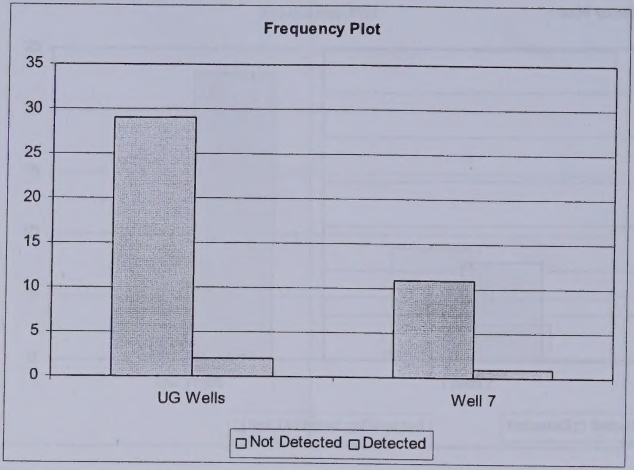
*Input:*

| | |
|---|---|
| Background well n = | 31 |
| Background well Sum of Counts= | **5.7** |
| Downgradient wells n = | 12 |
| Downgradient wells Sum of Counts = | **4.85** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.45282418 |
| c = n downgradient/n background | 0.38709677 |
| **Upper prediction limit =** | **7.81717997** |

If upper prediction limit is greater than the downgradient wells sum of counts, the downgradient wells do not have a significantly greater chance of being contaminated than background.

Poisson Prediction Limit Method for Processing Non-Detect Data as presented in *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance* (Office of Solid Waste, U.S.E.P.A., 1992)

**Cadmium, Upgradient Wells vs BT-7**



| | Descriptive Statistics (PS_CD.sta) | | | | | |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Cd UG | 31 | 0.183871 | 0.250000 | 0.050000 | 1.000000 | 0.181837 |
| Cd 7 | 12 | 0.195833 | 0.050000 | 0.050000 | 1.000000 | 0.270906 |

***Poisson Prediciton Limit***

Upgradient Wells vs. BT 7

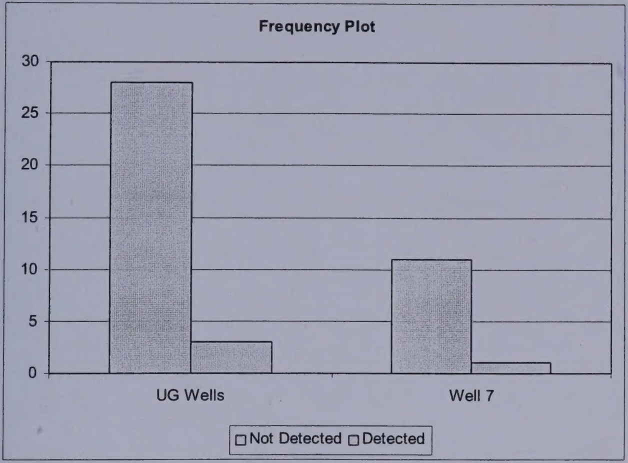
*Input:*

| | |
|---|---|
| Background well n = | 31 |
| Background well Sum of Counts= | **5.7** |
| Downgradient wells n = | 12 |
| Downgradient wells Sum of Counts = | **2.35** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.45282418 |
| c = n downgradient/n background | 0.38709677 |
| **Upper prediction limit =** | **7.81717997** |

If upper prediction limit is greater than the downgradient wells sum of counts, the downgradient wells do not have a significantly greater chance of being contaminated than background.

Poisson Prediction Limit Method for Processing Non-Detect Data as presented in *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance* (Office of Solid Waste, U.S.E.P.A., 1992)

**Zinc, Upgradient Wells vs BT-7**



|  | Descriptive Statistics (PS_ZN.sta) |  |  |  |  |  |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Zn UG | 29 | 0.016552 | 0.010000 | 0.005000 | 0.180000 | 0.031963 |
| Zn 7 | 12 | 0.011667 | 0.010000 | 0.005000 | 0.040000 | 0.009129 |

***Poisson Prediciton Limit***

**Upgradient Wells vs. BT 7**

*Input:*

|  |  |
|---|---|
| Background well n = | 31 |
| Background well Sum of Counts = | **0.51** |
| Downgradient wells n = | 12 |
| Downgradient wells Sum of Counts = | **0.139** |
| *Calculated:* |  |
| Students t for one-sided 99% = | 2.45282418 |
| c = n downgradient/n background | 0.38709677 |
| **Upper prediction limit =** | **3.09492524** |

If upper prediction limit is greater than the downgradient wells sum of counts, the downgradient wells do not have a significantly greater chance of being contaminated than background.

Poisson Prediction Limit Method for Processing Non-Detect Data as presented in *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance* (Office of Solid Waste, U.S.E.P.A., 1992)

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# Groundwater Monitoring

## Sanitary Landfill

*Prepared for:*

**City of Big Timber**

*PO Box 416*
*Big Timber, MT 59011*

*Prepared by:*

**Tetra Tech**

*618 South 25th Street*
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*Fax (406) 248-9282*
Tetra Tech Project No. 1159731053.100

August 31, 2007

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# 1.0 INTRODUCTION

This report presents groundwater monitoring data collected by Tetra Tech at the Big Timber Sanitary Landfill (Figures 1 and 2) on May 11, 2007. Tetra Tech personnel completed groundwater monitoring activities at the landfill in accordance with the *Professional Services Agreement* between the City of Big Timber and Tetra Tech, dated February 19, 2007 and the *Proposal for Environmental Services* dated February 2007 (Tetra Tech, 2007).

The Big Timber Sanitary landfill started receiving waste in 1992, stopped accepting waste in April 1997, and has completed implementation of its closure plan. This sampling event was conducted to partially fulfill the post-closure care requirements promulgated in the Administrative Rules of Montana Title 17, Chapter 50, Sub-Chapter 5 (ARM 17.50.531). Methods used to complete groundwater monitoring activities and results of this monitoring event are described in Sections 2.0 and 3.0 of this report, respectively.

# 2.0 METHODS

Field data collection activities and laboratory analyses were completed in accordance with procedures described in previous groundwater monitoring reports (Maxim, 2001) and shown on the Groundwater Sampling Logs presented in Appendix A. In accordance with previous groundwater monitoring events the following activities were conducted:

- Groundwater samples were collected from monitoring wells BT-1S, BT-2 and BT-7.
- Groundwater samples were not collected from monitoring wells BT-1D and BT-3 through BT-6.

Data validation methods and the statistical test methods are discussed further in Sections 4.0 and 5.0 of this report, respectively.

# 3.0 RESULTS

The following sections present data collected at the Big Timber Sanitary Landfill during this monitoring event. These data are also discussed and compared with data collected during previous monitoring events.

## 3.1 GROUNDWATER ELEVATIONS

A summary of all groundwater level data measured at the landfill since September 1989 is contained in Appendix B. A potentiometric surface contour map of groundwater elevations calculated from the data collected during this monitoring event is presented on Figure 3. Based on the groundwater potentiometric surface data, groundwater flows in a southwesterly direction under a gradient of approximately 0.018 feet per feet in the southwestern portion of the property, downgradient of the former waste cell and burn pit. The flow direction is similar to previous measurements. However, the gradient decreased from approximately 0.025 feet per feet during the April 2001 monitoring event.

Hydrographs were plotted for monitoring wells BT-1D, BT-1S, BT-2, BT-3, BT-4, BT-5, BT-6, and BT-7 using the water level data collected since October 1994 (Appendix B). These hydrographs indicate that seasonal fluctuations in the shallow water table under the landfill are generally not

significant except in the southwest corner of the site where the groundwater elevation in well BT-6 fluctuates over five feet seasonally.

Hydraulic conductivities ranging from 0.31 feet per day (feet/day) to 0.85 feet/day were calculated using data from single well aquifer tests conducted at the site (Chen-Northern, Inc., 1990). The effective porosity of the water-bearing sandstone, siltstone, and mudstone at the site is estimated to be 20 percent (Chen-Northern, Inc., 1990). Based on the measured gradients, the groundwater velocity calculated using Darcy's Law (Freeze and Cherry, 1979) is expected to range from 0.026 to 1.14 feet/day at the site. Groundwater velocity calculations are contained in Appendix C. The transport distance from the former waste cell to downgradient wells BT-6 and BT-7 is approximately 300 feet. Using the range of linear flow velocities, the travel time to reach the downgradient wells (BT-6 and BT-7) would range from approximately three to eight years.

The landfill cell is located between wells BT-2 and BT-7 as shown on Figure 3. This cell was excavated in the unconsolidated silty clay and weathered shale to an approximate depth of 20 feet. Based on previously collected data the base of the landfill cell is approximately 10 feet above the April 27, 2001 potentiometric surface (Maxim Technologies, Inc., 2001). Historical groundwater level data collected at the Big Timber Landfill (Appendix B), indicates the May 2007 potentiometric surface represents the near low groundwater elevation. Seasonal groundwater fluctuations at the site are approximately five to six feet at the furthest southwest corner of the property. During periods of high groundwater elevations the base of the landfill cell would be approximately four to five feet above the groundwater potentiometric surface (Maxim Technologies, Inc., 2001).

## 3.2 GROUNDWATER QUALITY

Groundwater samples were collected from monitoring wells BT-1S, BT-2, and BT-7 on May 11, 2007. A sample could not be collected from monitoring well BT-6 as the well was dry. Copies of groundwater sampling logs from this monitoring event are contained in Appendix A. The laboratory results from this monitoring event are summarized in Table 1. Laboratory analytical results and chain-of-custody forms for groundwater samples collected at the landfill during this sampling event are presented in Appendix D. A summary of all laboratory analytical collected to date is presented in Appendix E.

### 3.2.1 Inorganic Water Quality

Of the inorganic parameters analyzed, electrical conductivity (EC), chloride, sulfate, chemical oxygen demand (COD), nitrate plus nitrite as nitrogen, barium, chromium, copper, iron, selenium and silver were detected with concentrations above their respective laboratory practical quantitation limits (PQLs) during this monitoring event. However, all detected parameter concentrations were below groundwater protection standards as described in ARM 17.50.710(5). Concentrations of inorganic constituents in downgradient well BT-7 did not appear indicative of any landfill leachate migration.

### 3.2.2 Organic Water Quality

Concentrations of volatile organic compounds (VOCs) were below their respective PQLs in all water samples collected at the landfill during this monitoring event. No VOC groundwater protection standard has ever been exceeded in any groundwater sample collected at the former Big Timber Landfill site.

## TABLE 1
## GROUNDWATER ANALYTICAL RESULTS
## BIG TIMBER SANITARY LANDFILL
## MAY 11, 2007

| PARAMETER | UNITS | MDEQ REGULATORY CONC.[1] | BT-1S | BT-101 [2] | BT-2 | BT-7 |
|---|---|---|---|---|---|---|
| Temperature | °C | NA | 10.6 | 10.6 | 10.6 | 11.3 |
| Electrical Conductivity | µmhos/cm | NA | 1380 | 1380 | 606 | 1,290 |
| Chloride | mg/l | NA | 104 | 102 | 45 | 170 |
| Sulfate | mg/l | NA | 325 | 322 | 152 | 233 |
| Chemical Oxygen Demand | mg/l | NA | 15J | 24J | 14 | 29 |
| Cyanide | mg/l | 0.2 | <0.005 | <0.005 | <0.005 | <0.005 |
| pH | s.u. | NA | 8.8 | 7.8 | 8.6 | 7.6 |
| Nitrate+Nitrite as N | mg/l | 10 | 6.13 | 6.10 | 0.02 | 0.04 |
| Antimony | mg/l | 0.006 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic | mg/l | 0.05 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium | mg/l | 2.0 | <0.02 | 0.02 | <0.02 | <0.02 |
| Beryllium | mg/l | 0.004 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | mg/l | 0.005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium | mg/l | 0.1 | 0.002 | 0.002 | <0.001 | <0.001 |
| Cobalt | mg/l | NA | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper | mg/l | 1.3 | 0.002J | 0.008J | 0.001 | 0.002 |
| Iron | mg/l | NA | <0.05 | <0.05 | <0.05 | 0.06 |
| Lead | mg/l | 0.015 | <0.003 | <0.003 | <0.003 | <0.001 |
| Mercury | mg/l | 0.002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel | mg/l | 0.1 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium | mg/l | 0.05 | 0.01 | 0.011 | <0.005 | 0.005 |
| Silver | mg/l | 0.1 | <0.0005 | <0.0005 | <0.0005 | 0.007 |
| Thallium | mg/l | 0.002 | 0.001 | <0.001 | <0.001 | <0.001 |
| Vanadium | mg/l | NA | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc | mg/l | 2.0 | <0.01 | <0.01 | <0.01 | <0.01 |
| VOCs[3] | µg/l | ND | ND | ND | ND | ND |

[1] Regulatory Concentration = Regulatory concentration as defined by Maximum Contaminant Level (MCL), Title 40 Code of Federal Regulations, Part 141 (US EPA, 2006) or Montana Human Health Standard (HHS) if a MCL has not been promulgated (MDEQ, 2006).
[2] Duplicate of well BT-1S
[3] VOCs – Volatile organic compounds analyzed by EPA Method 8260, see laboratory report in Appendix D for reporting limits

| | | | |
|---|---|---|---|
| s.u. = standard units | ND = not detected at laboratory reporting | °C = degrees Centigrade | NA = Not applicable |
| mg/l = milligrams per liter | µg/l = micrograms per liter | µmhos/cm = micromhos per centimeter | J = Estimated value |

# 4.0 DATA VALIDATION

This section describes the data validation process used to determine the adequacy and quality of laboratory analytical data collected at the Big Timber Landfill. The objective of data validation is to identify any unreliable or invalid laboratory measurements and qualify that data for interpretive use. These validations are performed according to guidelines prepared by US EPA Functional Guidelines (1999, 2002).

## 4.1 FIELD QUALITY ASSURANCE/QUALITY CONTROL

A field duplicate sample was collected from well BT-1S and labeled as BT-101. This sample was delivered to the laboratory on May 11, 2007. The field duplicate sample from well BT-1S was analyzed for all parameters listed in Table 1 of ARM 17.50.708 plus dichlorodifluoromethane.

Analytical results for the original and field duplicate samples collected from well BT-1S were evaluated using the following criteria:

1) The relative percent difference (RPD) between the two samples was calculated when both values of the natural/duplicate pair were greater than five times the practical quantitation limit (PQL) for a given analyte.

2) The absolute value difference (AVD) between the natural and replicate sample for a given analyte was calculated when one or both values were less than five times the PQL.

RPDs are calculated by dividing the difference between the two reported values for a given parameter by the average of the two parameters. Analytical results of parameters where the RPD was greater than 20 percent are considered estimated concentrations. Results from natural/replicate pairs with values less than five times the PQL are considered estimated when the AVD exceeds the PQL. The results met the duplication criteria except as follows.

- Chemical oxygen demand (COD) exhibited an RPD of 46 percent. The BT-1S and BT-101 COD concentrations have been qualified as estimated.

- The RPD for dissolved copper was 120 percent. The BT-1S and BT-101 copper concentrations have been qualified as estimated.

Analytical results for the trip blank were evaluated using the following criteria:

1) Blank analytical results are reviewed to determine if any parameter was measured at detectable concentrations.

2) All results greater than the PQL but less than five times the concentration of the blank are considered estimated and are likely biased toward the high end.

3) Common laboratory contaminants (methylene chloride, acetone, and 2-butanone) are considered estimated when results are greater than the PQL but less than 10 times the concentration of the contaminated blank.

The trip blank submitted to the laboratory on May 11 was not analyzed due to an oversight on the part of the laboratory. None of the samples submitted with the May 11 trip blank contained

any volatile organic compounds. Therefore the missing trip blank results did not have an affect on the evaluation of the data quality.

## 4.2 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

Northern Analytical Laboratories, Inc. (NAL) received groundwater samples from Big Timber Landfill on May 11, 2007. Chain-of-custody documents accompanied the samples from sample collection to receipt at the laboratory. Samples were received cool with a cooler temperature of 1.8° C. The pH was measured in all bottles to assure proper field preservation techniques were used. The samples were received properly preserved. All of the analysis was performed within the respective holding time for each analyte.

NAL's quality assurance coordinator reviewed all analytical data associated with these samples. This review included calibration standards, calibration verification standards, blanks, laboratory controls, laboratory duplicates, and laboratory spikes. A summary of the QC is presented in Appendix F, Tables F-1 and F-2.

System performance check compounds (SPCC) and calibration check compounds (CCC) are used to evaluate proper system performance and calibration for VOC analyses. Review of these data indicates the gas chromatograph mass spectrophotometer system was performing properly. No analytes were detected in the method blank. The lab control sample (LCS) recoveries were acceptable. The matrix spike/matrix spike duplicate (MS/MSD) recoveries were within established limits except for the MS/MSD performed on sample BT-101. 1,1-Dichloroethene exhibited high recovery at 122 percent in the MS. The MSD recovery was acceptable at 86 percent. The RPD between the MS and MSD was above the 20 percent limit at 35 percent. The BT-101 sample concentration did not require qualification as 1,1-dichloroethene was not detected in the sample and therefore, was not affected by the high MS recovery. Three surrogate compounds are added to each sample and QC sample prior to analysis. All of the surrogate recoveries were within the acceptance limits.

Review of the inorganic and metals quality indicators showed that the inorganic and metals analyses were in compliance with NAL's published QA/QC criteria except for the following.

- Silver was present in the method blank at 0.0010 mg/l. Silver was not detected in any of the Big Timber Landfill samples. The silver concentration in the blank was qualified "B". The sample concentrations did not require qualification.

# 5.0 STATISTICAL QUALITY ASSURANCE/QUALITY CONTROL ANALYSIS

## 5.1 STATISTICAL TEST METHODS

Data in this statistical evaluation have small sample sizes and exhibit non-normal distributions for which non-parametric statistical techniques are appropriate (US EPA 1989 and 1992). Multiple comparison procedures, testing the difference between the downgradient well (BT-7) and upgradient wells (BT-1s and BT-2) are performed at the 99 percent confidence level. If there is a statistically significant difference, then there is evidence that the downgradient well exceeds background concentrations. While no new data was collected from monitoring well BT-6, a statistical analysis of the historical data for this well was conducted.

When the percentage of non-detects in the data set are less than or equal to 50 percent, the Mann-Whitney test is used as non-parametric method for the comparison of median concentrations. Use of this test is recommended where data are not normally distributed and these tests tend to be more

powerful than parametric tests for detecting differences in small data sets. Sample sizes of four or more observations for each well are recommended (US EPA 1992). Individual well comparisons are one-sided, testing the alternative that the concentration in the downgradient well is greater than the background well. In each test, data are ranked prior to median calculation and the tests are performed on the ranks. Resulting p-values are used to test the significance of differences. A p-value less than or equal to 0.01 indicates a statistically significant difference in medians at the 99 percent confidence level (individual well comparisons).

If more than 50 percent of the data set are below detection, but more than 10 percent of the observations are quantified, the test of proportions, also know as contingency table analysis, is used as a test of the proportion of non-detects in each well. Use of this technique is recommended by the US EPA (1989 and 1992) and is endorsed by Helsel and Hirsch (1992) as an alternative in heavily censored data. Individual well comparisons are one-sided, testing the alternative that proportion of detects in the downgradient well is greater than background. A chi-square statistic is calculated by comparing the observed counts with the expected counts when the null hypothesis is true. This statistic is compared to the 99th (individual well comparisons) quantiles of the chi-square distribution. If the calculated statistic is greater than the tabulated chi-square test statistic, this indicates a statistically significant difference at the 99 percent confidence level.

When 90 percent or more of the data are below the detection limit, US EPA (1988 and 1992) and Gibbons (1994) recommend the use of the Poisson prediction interval method to test whether a rare observation represents a significant increase over background levels. For comparison purposes, an upper limit is calculated from background data. To test the upper prediction limit, the sum of the Poisson counts of the independent observations made in the comparison wells are calculated. The 99 percent confidence level is used for individual well comparisons. If this sum is greater than the upper prediction limit, there is evidence of significant increase over background levels. It should be noted that since power functions are used in calculating the upper limit, all calculations are performed using units of micrograms per liter.

Analytical data reported for these wells have multiple detection limits for any one parameter over the time period represented by the data. These data have been censored following US EPA guidance (US EPA 1989 and US EPA 1992) and using techniques appropriate to the statistical method. For the Kruskal-Wallis and Mann-Whitney tests, an attempt is made to censor non-detect values at the highest detection limit as recommended by Helsel and Hirsh (1992). In instances where the highest detection limit is extreme or masks a large proportion of the data, the observations associated with the extreme values are discarded and the remaining non-detects are censored at the next highest limit. Non-detect data are then further censored to distinguish between data detected at the practical quantitation limit (PQL) and data between the method detection limit (MDL) and PQL. Data evaluated by contingency tables are not censored since this is simply a test of proportions (Helsel and Hirsch 1992). For calculating Poisson prediction intervals, non-detect data are replaced by one half the practical quantitation limit associated with the observation (US EPA 1992).

## 5.2 STATISTICAL TEST RESULTS

Of those parameters listed in Table 1 of ARM 17.50.708, the following parameters exhibited detectable concentrations at or above the PQL on at least one occasion over the period of record in samples collected from downgradient monitoring well BT-7: antimony, arsenic, barium, cadmium, chloride, cobalt, chemical oxygen demand (COD), chromium, copper, iron, nickel, pH, specific conductance, selenium, silver, sulfate (SO4) and zinc. For those downgradient wells exhibiting detectable concentrations of these parameters, water quality data over the period of record were statistically evaluated to determine which showed a statistically significant increase when compared to the background wells. Data used in the statistical evaluation of these parameters are listed in Appendix F.

Results of statistical analyses are summarized in Table 2 and output from statistical analyses including descriptive statistics, data plots, and test results are presented in Appendix F. Seventeen tests were performed at the 99 percent confidence level. This represents a site-wide false positive rate of about 16 percent. The site wide false positive rate indicates the probability that the statistical evaluation will yield a positive result when, in fact, it is not. In this reporting period, there is almost a 1 in 7 probability of one or more false positives due to chance.

Of the seventeen parameters tested, chloride and pH in BT-7 exhibited concentrations that were statistically significantly greater than background levels. The null hypothesis, that these parameter concentrations were not significantly greater, was accepted for all parameters. The parameter differences are likely the effect of parent material influences on groundwater quality relative to the physiographic position. It appears these increased concentrations were more likely due to generally poor groundwater quality and potential false positive than former landfill operations.

A statistical analysis of intrawell temporal chloride concentrations concluded that the May 2007 chloride concentration in well BT-7 is not increasing over time and is most likely naturally occurring. Based on the data presented above it does not appear the former Big Timber Landfill has impacted groundwater quality at the site.

## TABLE 2
## SUMMARY OF STATISTICAL COMPARISONS TO BACKGROUND
## BIGTIMBER SANITARY LANDFILL
## May 11, 2007

| Parameter | Statistical Tests(1) | Sample Sizes(2) | Mann-Whitney Wells / P-Values(3) BT-6 / BT-7 | Contingency Table Wells / P-Values(4) BT- 6/ BT-7 | Poisson Prediction Limit(5) BT-6 / BT-7 | Statistically Significant Exceedance |
|---|---|---|---|---|---|---|
| Arsenic | PPI | 29/12/11 | - | - | 47.34 / 43.86 | None |
| Silver | PPI | 29/12/11 | - | - | 8.08 / 7.53 | None |
| Barium | CT | 229/12/11 | - | 0.50 / 0.29 | - | None |
| Cadmium | PPI | 29/12/11 | - | - | 7.43 / 6.92 | None |
| Chloride | MW | 29/12/11 | 0.54 / 0.00 | - | - | BT-7 |
| Cobalt | PPI | 29/12/11 | - | - | 36.14 / 33.52 | None |
| COD | MW | 29/12/11 | 0.22 / 0.02 | - | - | None |
| Chromium | CT | 29/12/11 | - | 0.87 / 0.98 | - | None |
| Copper | CT | 29/12/11 | - | 0.43 / 0.11 | - | None |
| Iron | CT | 29/12/11 | - | 0.03 / 0.29 | - | None |
| Nickel | PPI | 29/12/11 | - | - | 197.54 / 182.15 | None |
| pH | MW | 29/12/11 | 0.79 / 0.00 | - | - | BT-7 |
| Antimony | CT | 29/12/11 | - | 0.96 / 0.14 | - | None |
| SC | MW | 29/12/11 | 0.60 / 0.24 | - | - | None |
| Selenium | CT | 29/12/11 | - | (6) | - | None |
| Sulfate | MW | 29/12/11 | (6) / 0.40 | - | - | None |
| Zinc | CT | 29/12/11 | - | - | 3.61 / 3.35 | None |

Notes:

1) MW - Mann-Whitney Rank Sum; CT - Contingency Table; PPI - Poisson Prediction Interval;
2) Parameter sample sizes for each well included in statistical evaluation: Upgradient group of BT-1s,2,3,4,5/BT-6/BT-7.
3) The p-value is the probability of obtaining the calculated test statistic given that the null hypothesis is true.
4) The p-value is the probability of obtaining the calculated test statistic given that the null hypothesis is true; It is determined by comparing the chi-square statistic to the chi-square distribution with 1 degree of freedom (individual comparisons).
5) The Poisson prediction limits report the upper prediction limit based on background observations.
6) The comparison of one or more downgradient wells to upgradient well group was not meaningful since the median value or proportion of detects to non-detects for the upgradient well group was greater than (or less than in the case of pH) the downgradient well(s).

# 6.0 CONCLUSIONS AND RECOMMENDATIONS

This report includes statistical analysis and hydrological review of historical data at the Big Timber Landfill for the purposes of establishing recommendations for future work at the facility. The results of this report identify the following:

- Groundwater flow under the former Big Timber Landfill was to the southwest at a gradient of approximately 0.018 feet per feet.
- No VOC concentrations were detected in the groundwater samples collected during the May 2007 groundwater monitoring event. The organics analyses have not detected any VOCs during the history of monitoring at the site.
- No inorganic parameter concentration exceeded any US EPA drinking water maximum contaminant level or the MDEQ Human Health Standard. The concentrations of inorganic constituents in downgradient wells BT-6 and BT-7 do not appear indicative of any landfill leachate migration.
- Statistical analysis of regulated inorganic constituents detected in groundwater samples collected at the Big Timber Landfill concluded that there was not a statistically significant difference in downgradient wells compared to upgradient wells except for chloride and pH in well BT-7. The chloride concentration and pH in well BT-7 was statistically significantly greater than concentrations in the background wells. The statistically significant increase in chloride concentration in well BT-7 relative to chloride concentrations in upgradient monitoring wells may be due to the naturally occurring higher concentrations of chloride in geologic sediments surrounding well BT-7.
- A statistical analysis of intrawell temporal chloride concentrations concluded that the May 2007 chloride concentration in well BT-7 is not increasing over time and is most likely naturally occurring.
- Based on the data presented above it does not appear the former Big Timber Landfill has impacted groundwater quality at the site.

# 7.0 LIMITATIONS

This work was performed in accordance with the generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Tetra Tech observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Tetra Tech's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of the monitoring. Other than this, no warranty is implied or intended.

| Prepared by: | Reviewed by: |
|---|---|
| Ryan N. Sparhawk | |
| Ryan N. Sparhawk<br>Environmental Scientist | Jeffrey R. Rice<br>Environmental Group Manager |

# 8.0 REFERENCES CITED

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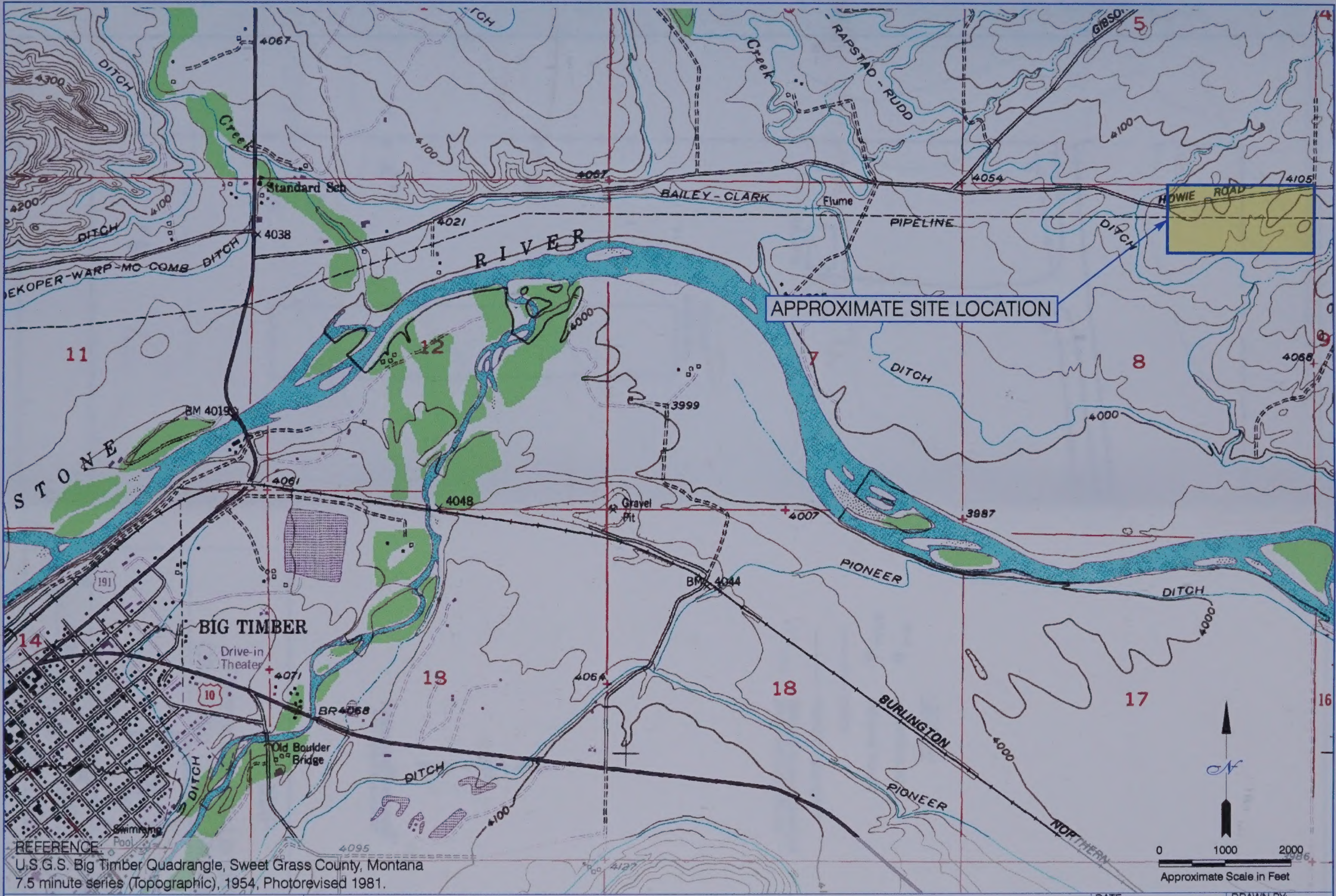
# FIGURES

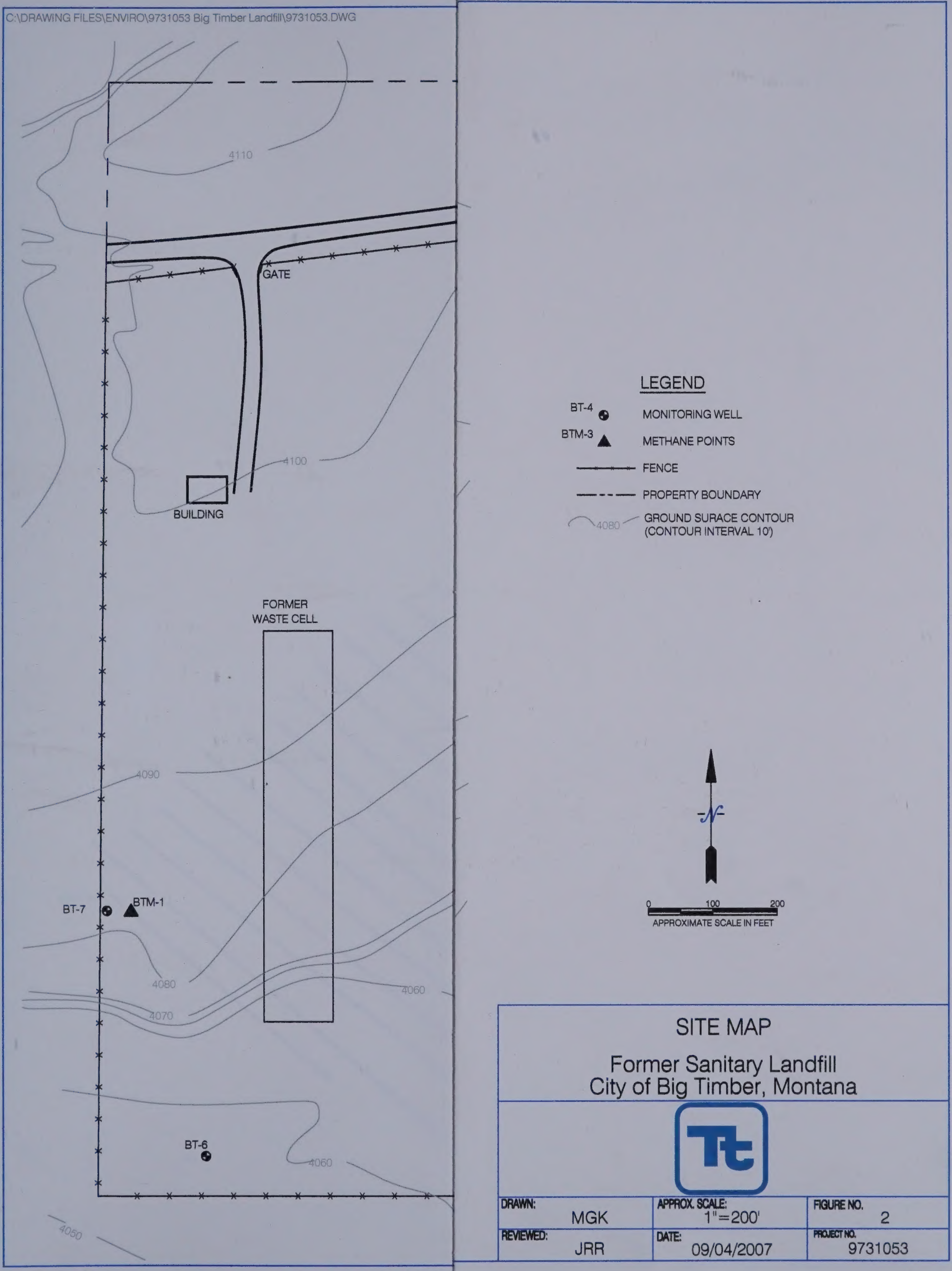

APPROXIMATE SITE LOCATION
HOWIE ROAD
BAILEY - CLARK
PIPELINE
Flume
RIVER
STONE
DITCH
Creek
RAPSTAD - RUDD
GIBSON
Standard Sch
DEKOPER-WARP-MC COMB DITCH
BIG TIMBER
Drive-in Theater
Gravel Pit
Old Boulder Bridge
Swimming Pool
PIONEER
BURLINGTON
NORTHERN
BM 4019
BM 4044
BR 4068
4067
4038
4021
4057
4054
4105
4068
4000
3999
4061
4048
4007
3987
4071
4064
4095
4127
4100
4200
4300
5
7
8
9
11
12
13
14
16
17
18
191
10
N
0
1000
2000
Approximate Scale in Feet

REFERENCE:
U.S.G.S. Big Timber Quadrangle, Sweet Grass County, Montana
7.5 minute series (Topographic), 1954, Photorevised 1981.

## SITE LOCATION MAP

Former City of Big Timber Sanitary Landfill
Sweet Grass County, Montana

| | |
|---|---|
| DATE: 07/24/2007 | DRAWN BY: MGK |
| REVIEWED: JRR | APPROX. SCALE: 1"=2000' |
| PROJ. NO.: 9731053 | FIGURE NO.: 1 |


C:\DRAWING FILES\ENVIRO\9731053 Big Timber Landfill\9731053.DWG
4110
GATE
4100
BUILDING
FORMER WASTE CELL
4090
BT-7
BTM-1
4080
4070
4060
BT-6
4060
4050
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
N
0
100
200
APPROXIMATE SCALE IN FEET

SITE MAP

Former Sanitary Landfill
City of Big Timber, Montana

| | | |
|---|---|---|
| DRAWN: MGK | APPROX. SCALE: 1"=200' | FIGURE NO. 2 |
| REVIEWED: JRR | DATE: 09/04/2007 | PROJECT NO. 9731053 |

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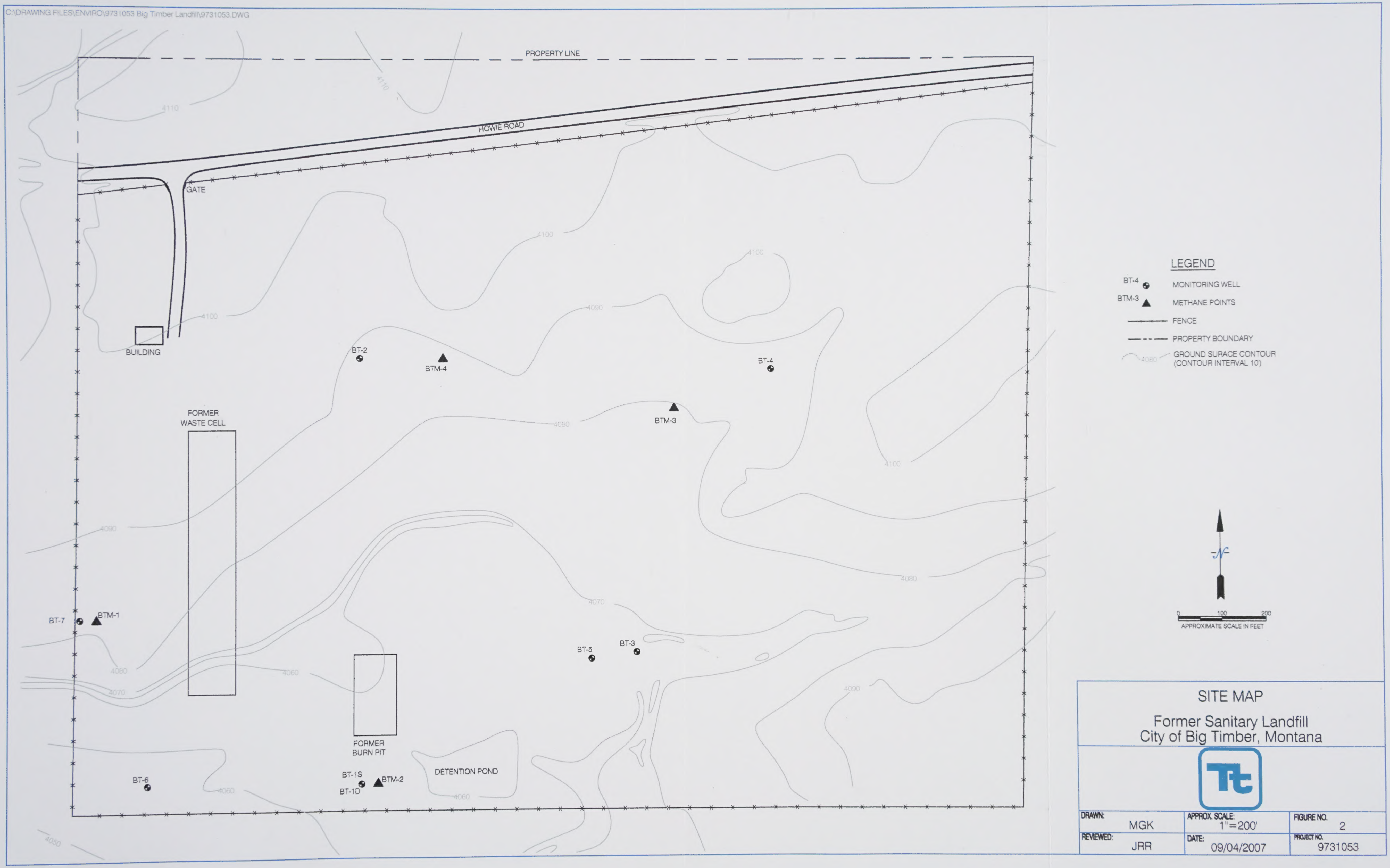
PROPERTY LINE
HOWIE ROAD
GATE
BUILDING
BT-2
BTM-4
BT-4
BTM-3
FORMER WASTE CELL
BT-7
BTM-1
BT-5
BT-3
FORMER BURN PIT
BT-1S
BT-1D
BTM-2
DETENTION POND
BT-6
4110
4100
4090
4080
4070
4060
4050
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
N
0
100
200
APPROXIMATE SCALE IN FEET

SITE MAP

Former Sanitary Landfill
City of Big Timber, Montana

| | | |
|---|---|---|
| DRAWN: MGK | APPROX. SCALE: 1"=200' | FIGURE NO. 2 |
| REVIEWED: JRR | DATE: 09/04/2007 | PROJECT NO. 9731053 |

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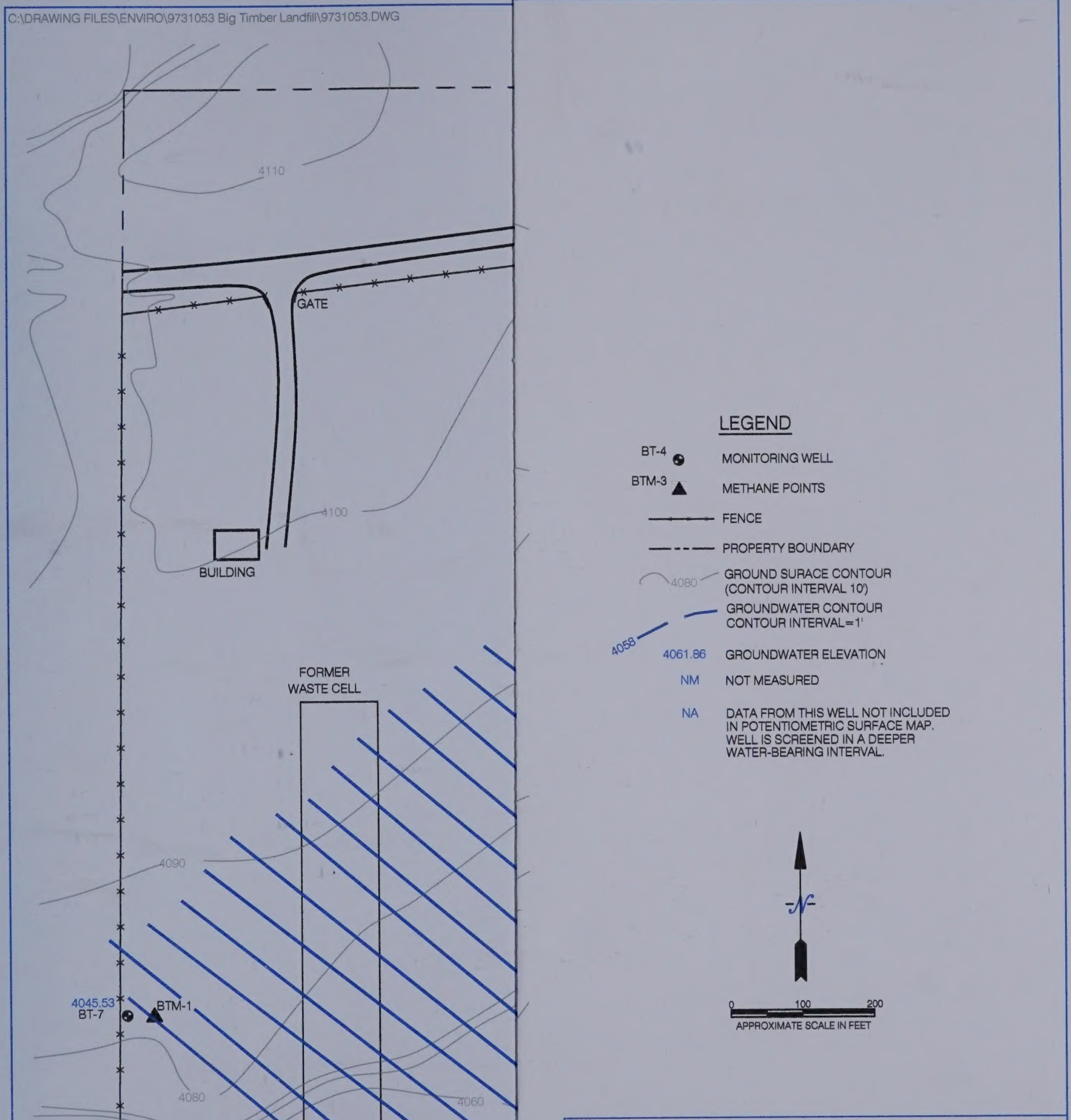
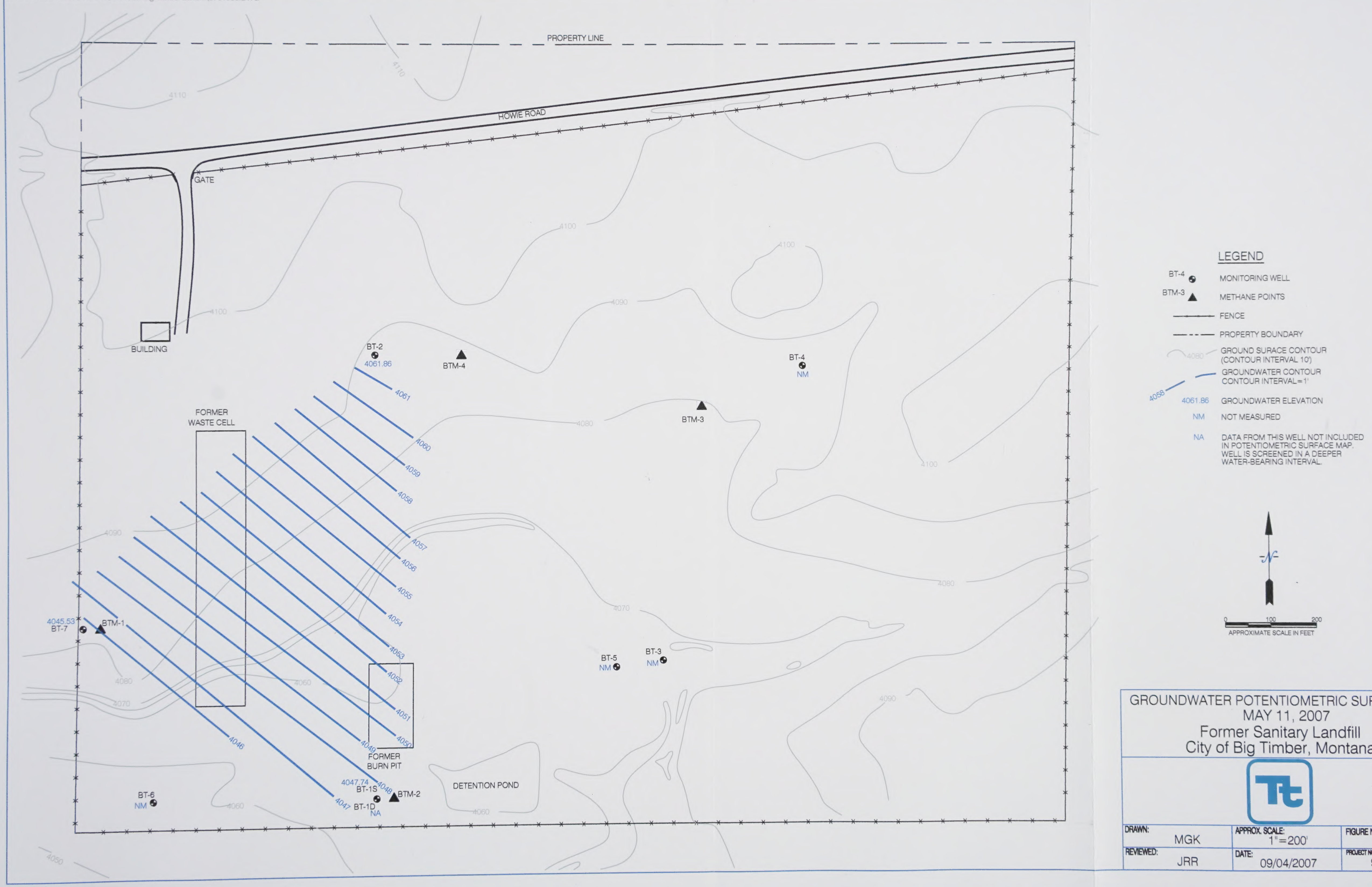

4110
GATE
4100
BUILDING
FORMER WASTE CELL
4090
4045.53
BT-7
BTM-1
4080
4070
4060
4046
BT-6
NM
4060
4050
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
4058 GROUNDWATER CONTOUR CONTOUR INTERVAL=1'
4061.86 GROUNDWATER ELEVATION
NM NOT MEASURED
NA DATA FROM THIS WELL NOT INCLUDED IN POTENTIOMETRIC SURFACE MAP. WELL IS SCREENED IN A DEEPER WATER-BEARING INTERVAL.
N
0
100
200
APPROXIMATE SCALE IN FEET

GROUNDWATER POTENTIOMETRIC SURFACE MAP
MAY 11, 2007
Former Sanitary Landfill
City of Big Timber, Montana

| | | |
|---|---|---|
| DRAWN: MGK | APPROX. SCALE: 1"=200' | FIGURE NO. 3 |
| REVIEWED: JRR | DATE: 09/04/2007 | PROJECT NO. 9731053 |

C:\DRAWING FILES\ENVIRO\9731053 Big Timber Landfill\9731053.DWG


PROPERTY LINE
HOWIE ROAD
GATE
BUILDING
4110
4100
4090
4080
4070
4060
4050
FORMER WASTE CELL
FORMER BURN PIT
DETENTION POND
BT-2
4061.86
BTM-4
BT-4
NM
BTM-3
BT-5
NM
BT-3
NM
BT-7
4045.53
BTM-1
BT-6
NM
BT-1S
4047.74
BT-1D
NA
BTM-2
4061
4060
4059
4058
4057
4056
4055
4054
4053
4052
4051
4050
4049
4048
4047
4046
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
4058 GROUNDWATER CONTOUR CONTOUR INTERVAL=1'
4061.86 GROUNDWATER ELEVATION
NM NOT MEASURED
NA DATA FROM THIS WELL NOT INCLUDED IN POTENTIOMETRIC SURFACE MAP. WELL IS SCREENED IN A DEEPER WATER-BEARING INTERVAL.
N
0
100
200
APPROXIMATE SCALE IN FEET

GROUNDWATER POTENTIOMETRIC SURFACE MAP
MAY 11, 2007
Former Sanitary Landfill
City of Big Timber, Montana

| | | |
|---|---|---|
| DRAWN: MGK | APPROX. SCALE: 1"=200' | FIGURE NO. 3 |
| REVIEWED: JRR | DATE: 09/04/2007 | PROJECT NO. 9731053 |

# APPENDIX A

# GROUNDWATER SAMPLING LOGS

# GROUNDWATER SAMPLING LOG

Project: Big timber Landfill Sample Date: 5-11-07 Sample Time: 1226 Well ID: BT-1S

Personnel: RS Weather: Pt Cloudy ~70°

Casing Diameter/Type: 2" PVC Measuring Point Description: N/th

Well Depth (feet below measuring point): 37.0' Depth to Water 19.93 ft water

Screen: Depth to Product

## WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☒ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, ☐ Peri pump ☐ Other:

17.07 ft. water x gal./ft * = one casing volume 2.8 gals. x 3 = purge volume 8.4 gals.

SCH 40 Pipe * 2" well [✓ = 0.163 gal./ft] 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Water Quality: Clear ODOR: YES or [✓ NO] SHEEN: YES or [✓ NO]

Comments:

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| 1206 | | | | | | |
| 1209 | 1.0 | 11.0 | 7.97 | 1309 | 40.1 | 10.21 |
| 1212 | 2.0 | 10.5 | 7.90 | 1441 | 65.9 | 6.54 |
| 1215 | 3.0 | 10.5 | 7.50 | 1497 | 75.1 | 6.31 |
| 1218 | 4.0 | 10.5 | 7.46 | 1498 | 81.0 | 6.75 |
| 1221 | 5.0 | 10.5 | 7.44 | 1504 | 82.8 | 6.54 |
| 1224 | 6.0 | 10.6 | 7.44 | 1502 | 84.0 | 5.04 |
| | | | | | | |
| Sample 1226 | | | | | | |
| | | | | | | |
| | | | | | | |

## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, ☐ Submersible Pump, ☐ Peri Pump ☐ Other: Sample Type: [✓ ☐ Natural], ☐ Duplicate, ☐ Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| ☐ | Methane | (1) 40 ml VOA | None | |
| ☒ | ~~Sulfate~~ Common Ions | (1) 250 ml poly plastic | None | |
| ☐ | HACH | (1) 1-liter poly plastic | None | |
| ☒ | Metals | (1) 125 ml poly plastic | Nitric acid | [✓ Filtered: ☒ Yes], ☐ No |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| ☐ | PAHs | (2) 1-liter amber glass | None | |
| ☐ | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| ☒ | cyanide | | | |
| ☒ | nutrients | | | |

Laboratory: Severn Trent: ☐ Arvada, CO, ☐ Austin, TX ☒ Northern Analytical Other Chain-of-Custody: ☒ Yes, ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | 5-11-07 |
| SC | | |
| ORP | | |
| DO | ysi 550 | |

Decontamination

Potable Water: ☒ Yes ☐ No Nitric Acid: ☐ Yes ☒ No

Liquinox: ☒ Yes ☐ No DI Water: ☒ Yes ☐ No

Methanol: ☒ Yes ☐ No

Comments:

:

# ROU DWATER SAMPLING LOG

Project: Big Timber Landfill Sample Date: 5-11-07 Sample Time: Well ID: BT-101

Personnel: RS Weather: P. Cloudy ~70°

Casing Diameter/Type: 2" pvc Measuring Point Description: N/th

Well Depth (feet below measuring point): 37.0 Depth to Water 19.93 ft water

Screen: Depth to Product

## WELL EVACUATION

Method: [ ] Mechanical Bailer, [ ] Galvanized Bailer, [ ] PVC Bailer, ☒ Disp. Polyethylene Bailer, [ ] SST Bailer, [ ] Submersible Pump, [ ] Peri pump [ ] Other:

ft. water x gal./ft * = one casing volume gals. x 3 = purge volume 8.4 gals.

SCH 40 Pipe * 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Water Quality: Clear ODOR: YES or [✓ NO] SHEEN: YES or [✓ NO]

Comments:

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| | See | | BT-15 | | | |

## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, [ ] Submersible Pump, [ ] Peri Pump [ ] Other: Sample Type: [ ] Natural, ☒ Duplicate, [ ] Field Blank

| | Parameter | Sample Container | Preservative |
|---|---|---|---|
| [ ] | BTEX | (2) 40 ml VOA | Hydrochloric acid |
| [ ] | MTBE | Extracted from BTEX VOA | Hydrochloric acid |
| [ ] | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid |
| [ ] | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid |
| [ ] | Methane | (1) 40 ml VOA | None |
| ☒ | ~~Sulfate~~ Common ions | (1) 250 ml poly plastic | None |
| [ ] | HACH | (1) 1-liter poly plastic | None |
| ☒ | Metals | (1) 125 ml poly plastic | Nitric acid Filtered: ☒ Yes, [ ] No |
| [ ] | VPH | (3) 40 ml VOA | Hydrochloric acid |
| [ ] | EPH | (2) 1-liter amber glass | Hydrochloric acid |
| [ ] | PAHs | (2) 1-liter amber glass | None |
| [ ] | VOC'S | (3) 40 ml VOA | Hydrochloric acid |
| [ ] | cyanide | | |
| [ ] | nutrients | | |

Laboratory: Severn Trent: [ ] Arvada, CO, [ ] Austin, TX, ☒ Northern Analytical Other Chain-of-Custody: ☒ Yes, [ ] No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | 5-11-07 |
| SC | ~ | ~ |
| ORP | ~ | ~ |
| DO | 45990 | ~ |

Decontamination

Potable Water: Yes ☒ No [ ] Nitric Acid: Yes [ ] No ☒

Liquinox: Yes ☒ No [ ] DI Water: Yes ☒ No [ ]

Methanol: Yes ☒ No [ ]

Comments:

# ROU DWATER SAMPLING LOG

Project: Big Timber landfill Sample Date: 5-11-07 Sample Time: 1130 Well ID: BT-2

Personnel: RS Weather: P. Cloudy ~65°

Casing Diameter/Type: 2" PVC Measuring Point Description: Nth

Well Depth (feet below measuring point): 43.0' Depth to Water 28.49 ft water

Screen: ____ Depth to Product ____

---

## WELL EVACUATION

Method: [ ] Mechanical Bailer, [ ] Galvanized Bailer, [ ] PVC Bailer, [✓] Disp. Polyethylene Bailer, [ ] SST Bailer, [ ] Submersible Pump, [ ] Peri pump [ ] Other:

14.51 ft. water x ____ gal./ft * = one casing volume 2.3 gals. x 3 = purge volume 6.9 gals.

SCH 40 Pipe * 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x C²

Water Quality: Clear ODOR: YES or [✓ NO] SHEEN: YES or [✓ NO]

Comments:

## EVACUATION DATA

| | Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|---|
| tart | 1110 | | | | | | |
| | 1113 | 1.0 | 11.6 | 6.53 | 682 | 393 | 3.35 |
| | 1116 | 2.0 | 10.9 | ~~6.66~~ 7.17 | 666 | 220 | 2.46 |
| | 1119 | 3.0 | 10.9 | 7.53 | 666 | 149.6 | 1.32 |
| | 1122 | 4.0 | 10.8 | 7.71 | 675 | 110.7 | 1.02 |
| | 1125 | 5.0 | 10.8 | 7.87 | 660 | 85.0 | 0.93 |
| | 1128 | 6.0 | 10.6 | 7.95 | 652 | 70.1 | 1.11 |
| | | | | | | | |
| Sample | 1130 | | | | | | |
| | | | | | | | |
| | | | | | | | |

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## WELL SAMPLING

Sampling Method: [✓] Disposable Poly Bailer, [ ] Submersible Pump, [ ] Peri Pump [ ] Other: ____ Sample Type: [✓] Natural, [ ] Duplicate, [ ] Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| [ ] | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| [ ] | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| [ ] | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| [ ] | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| [ ] | Methane | (1) 40 ml VOA | None | |
| [✓] | Sulfate Common ions | (1) 250 ml poly plastic | None | |
| [ ] | HACH | (1) 1-liter poly plastic | None | |
| [✓] | Metals | (1) 125 ml poly plastic | Nitric acid | Filtered: [✓] Yes, [ ] No |
| [ ] | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| [ ] | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| [ ] | PAHs | (2) 1-liter amber glass | None | |
| [ ] | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| [ ] | cyanide | | | |
| [ ] | nutrients | | | |

Laboratory: Severn Trent: [ ] Arvada, CO, [ ] Austin, TX, [✓] Northern Analytical Other ____ Chain-of-Custody: [✓] Yes, [ ] No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | 5-11-07 |
| SC | | |
| ORP | | |
| DO | ysi550 | |

Decontamination

Potable Water: Yes [✓] No [ ] Nitric Acid: Yes [ ] No [✓]

Liquinox: Yes [✓] No [ ] DI Water: Yes [✓] No [ ]

Methanol: Yes [✓] No [ ]

Comments:

:

N:ENVIRO\FORMS\GWSAMPLING LOG 2004

# ROU DWATER SAMPLING LOG

Project: Big Timber landfill Sample Date: ____ Sample Time: ____ Well ID: BT-6

Personnel: RS Weather: ____

Casing Diameter/Type: 2" PVC Measuring Point Description: Nth

Well Depth (feet below measuring point): 32.5 Depth to Water Dry ft water

Screen: ____ Depth to Product ____

---

## WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☒ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, ☐ Peri pump ☐ Other:

____ ft. water x ____ gal./ft * = one casing volume ____ gals. x 3 = purge volume ____ gals.

SCH 40 Pipe * 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x C²

Water Quality: ~~Clear ODOR: YES or [✓ NO] SHEEN: YES or [✓ NO]~~ RS

Comments: ____

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| Well | is Dry | — No | sample | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, ☐ Submersible Pump, ☐ Peri Pump ☐ Other: ____ Sample Type: ☒ Natural, ☐ Duplicate, ☐ Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| ☐ | Methane | (1) 40 ml VOA | None | |
| ☒ | ~~Sulfate~~ Common ions | (1) 250 ml poly plastic | None | |
| ☐ | HACH | (1) 1-liter poly plastic | None | |
| ☒ | Metals | (1) 125 ml poly plastic | Nitric acid | Filtered: ☒ Yes, ☐ No |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| ☐ | PAHs | (2) 1-liter amber glass | None | |
| ☐ | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | cyanide | | | |
| ☐ | nutrients | | | |

Laboratory: Severn Trent: ☐ Arvada, CO, ☐ Austin, TX ☒ Northern Analytical Other ____ Chain-of-Custody: ☒ Yes, ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | |
| SC | | |
| ORP | | |
| DO | ysi 550 | |

Decontamination

Potable Water: Yes ☒ No ☐ Nitric Acid: Yes ☐ No ☒

Liquinox: Yes ☒ No ☐ DI Water: Yes ☒ No ☐

Methanol: Yes ☒ No ☐

Comments: ____

N:ENVIRO\FORMS\GWSAMPLING LOG 2004

# ROU WATER SAMPLING LOG

Project: Big Timber LF Sample Date: 5-11-07 Sample Time: 1313 Well ID: BT-7

Personnel: RS Weather: P. Cloudy ~70°

Casing Diameter/Type: 2" PVC Measuring Point Description: Nth

Well Depth (feet below measuring point): 49.7' Depth to Water 40.18 ft water

Screen: ______ Depth to Product ______

## WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☒ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, ☐ Peri pump ☐ Other:

9.52 ft. water x ______ gal./ft * = one casing volume 1.6 gals. x 3 = purge volume 4.8 gals.

SCH 40 Pipe * [✓ 2" well = 0.163 gal./ft.] 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x C²

Water Quality: Cloudy ODOR: YES or [✓ NO] SHEEN: YES or [✓ NO]

Comments: ______

## EVACUATION DATA

| | Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|---|
| | 1259 | | | | | | |
| | 1302 | 1.0 | 11.7 | 7.41 | 1392 | 16.3 | 1.68 |
| | 1305 | 2.0 | 11.3 | 7.31 | 1383 | 30.5 | 1.62 |
| | 1308 | 3.0 | 11.3 | 7.29 | 1387 | 36.3 | 1.60 |
| | 1311 | 4.0 | 11.3 | 7.29 | 1384 | 37.4 | 1.55 |
| | | | | | | | |
| sample | 1313 | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, ☐ Submersible Pump, ☐ Peri Pump ☐ Other: ______ Sample Type: ☒ Natural, ☐ Duplicate, ☐ Field Blank

| | Parameter | Sample Container | Preservative | |
|---|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid | |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid | |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid | |
| ☐ | Methane | (1) 40 ml VOA | None | |
| ☐ | Sulfate | (1) 250 ml poly plastic | None | |
| ☐ | HACH | (1) 1-liter poly plastic | None | |
| ☒ | Metals | (1) 125 ml poly plastic | Nitric acid | Filtered: ☒ Yes, ☐ No |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid | |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid | |
| ☐ | PAHs | (2) 1-liter amber glass | None | |
| ☒ | VOC'S | (3) 40 ml VOA | Hydrochloric acid | |
| ☒ | Cyanide | | | |
| ☒ | Nutrients | | | |

Laboratory: Severn Trent: ☐ Arvada, CO, ☐ Austin, TX, ☒ Northern Analytical Other ______ Chain-of-Custody: ☒ Yes, ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | oakton | 5-11-07 |
| SC | | |
| ORP | | |
| DO | ysi 550 | |

Decontamination

Potable Water: Yes ☒ No ☐ Nitric Acid: Yes ☐ No ☒

Liquinox: Yes ☒ No ☐ DI Water: Yes ☒ No ☐

Methanol: Yes ☒ No ☐

Comments: ______

N:ENVIRO\FORMS\GWSAMPLING LOG 2004

# APPENDIX B

# GROUNDWATER ELEVATION DATA

# BILLINGS REGIONAL LANDFILL
## Groundwater Elevation Data
### Maxim Project No. 9731068

WELL NO. **BT-1S**
REFERENCE ELEVATION: **4067.78**
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (AMSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.42 | 4049.36 | | |
| 07/19/90 | 19.08 | 4048.70 | -0.66 | |
| 10/04/94 | 17.06 | 4050.72 | 2.02 | |
| 01/30/95 | 17.92 | 4049.86 | -0.86 | |
| 02/27/95 | 14.87 | 4052.91 | 3.05 | |
| 03/27/95 | 15.13 | 4052.65 | -0.26 | |
| 04/28/95 | 15.98 | 4051.80 | -0.85 | |
| 05/26/95 | 15.17 | 4052.61 | 0.81 | |
| 06/30/95 | 15.50 | 4052.28 | -0.33 | |
| 07/31/95 | 15.92 | 4051.86 | -0.42 | |
| 08/22/95 | 16.25 | 4051.53 | -0.33 | |
| 09/30/95 | 16.83 | 4050.95 | -0.58 | |
| 10/31/95 | 17.33 | 4050.45 | -0.50 | |
| 11/28/95 | 17.33 | 4050.45 | 0.00 | |
| 12/26/95 | 17.50 | 4050.17 | -0.28 | Well re-surveyed new reference elev 4067.67 |
| 01/16/96 | 17.51 | 4050.16 | -0.01 | |
| 10/08/96 | 16.67 | 4051.00 | 0.84 | |
| 04/29/97 | 16.00 | 4051.67 | 0.67 | |
| 12/10/97 | 15.71 | 4051.96 | 0.29 | |
| 11/19/98 | 17.64 | 4050.03 | -1.93 | |
| 05/06/99 | 18.15 | 4049.52 | -0.51 | |
| 10/20/99 | 19.54 | 4048.13 | -1.39 | |
| 04/25/00 | 20.47 | 4047.20 | -0.93 | |
| 10/18/00 | 20.96 | 4046.71 | -0.49 | |
| 04/07/01 | 20.41 | 4047.26 | 0.55 | |
| 05/11/07 | 19.93 | 4047.74 | 0.48 | |

WELL NO. **BT-1D**
REFERENCE ELEVATION: **4067.78**
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.36 | 4049.42 | | |
| 07/19/90 | 19.23 | 4048.55 | -0.87 | |
| 10/04/94 | 17.30 | 4050.48 | 1.93 | |
| 01/30/95 | 17.83 | 4049.95 | -0.53 | |
| 02/27/95 | 15.37 | 4052.41 | 2.46 | |
| 03/27/95 | 15.29 | 4052.49 | 0.08 | |
| 04/28/95 | 17.60 | 4050.18 | -2.31 | |
| 05/26/95 | 17.50 | 4050.28 | 0.10 | |
| 06/30/95 | 17.08 | 4050.70 | 0.42 | |
| 07/31/95 | 16.66 | 4051.12 | 0.42 | |
| 08/22/95 | 17.16 | 4050.62 | -0.50 | |
| 09/30/95 | 17.25 | 4050.53 | -0.09 | |
| 10/31/95 | 17.92 | 4049.86 | -0.67 | |
| 11/28/95 | 17.33 | 4050.45 | 0.59 | |
| 12/26/95 | 17.58 | 4049.85 | -0.60 | Well re-surveyed new reference elev 4067.43 |
| 01/16/96 | 17.38 | 4050.05 | 0.20 | |
| 10/08/96 | 16.58 | 4050.85 | 0.80 | |
| 04/29/97 | NM | NM | NM | |
| 12/10/97 | 15.85 | 4051.58 | 0.73 | |
| 11/19/98 | 18.07 | 4049.36 | -2.22 | |
| 05/06/99 | 18.85 | 4048.58 | -0.78 | |
| 10/20/99 | 19.28 | 4048.15 | -0.43 | |
| 04/25/00 | 19.75 | 4047.68 | -0.47 | |
| 10/18/00 | 19.77 | 4047.66 | -0.02 | |
| 04/07/01 | 21.92 | 4045.51 | -2.15 | |
| 05/11/07 | NM | NM | NM | |

# BILLINGS REGIONAL LANDFILL
## Groundwater Elevation Data
### Maxim Project No. 9731068

**WELL NO. BT-2**
**REFERENCE ELEVATION: 4090.55**
**REFERENCE POINT: TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 23.64 | 4066.91 | | |
| 07/19/90 | 27.29 | 4063.26 | -3.65 | |
| 10/04/94 | 26.34 | 4064.21 | 0.95 | |
| 01/30/95 | 23.71 | 4066.84 | 2.63 | |
| 02/27/95 | 23.50 | 4067.05 | 0.21 | |
| 03/27/95 | 23.33 | 4067.22 | 0.17 | |
| 04/28/95 | 25.03 | 4065.52 | -1.70 | |
| 05/26/95 | 24.42 | 4066.13 | 0.61 | |
| 06/30/95 | 24.50 | 4066.05 | -0.08 | |
| 07/31/95 | 25.00 | 4065.55 | -0.50 | |
| 08/22/95 | 25.00 | 4065.55 | 0.00 | |
| 09/30/95 | 25.16 | 4065.39 | -0.16 | |
| 10/31/95 | 25.42 | 4065.13 | -0.26 | |
| 11/28/95 | 25.58 | 4064.97 | -0.16 | |
| 12/26/95 | 25.83 | 4064.52 | -0.45 | Well re-surveyed new reference elev 4090.35 |
| 01/16/96 | 25.61 | 4064.74 | 0.22 | |
| 10/08/96 | 25.40 | 4064.95 | 0.21 | |
| 04/29/97 | 25.34 | 4065.01 | 0.06 | |
| 12/10/97 | 25.46 | 4064.89 | -0.12 | |
| 11/19/98 | 26.58 | 4063.77 | -1.12 | |
| 05/06/99 | 27.02 | 4063.33 | -0.44 | |
| 10/20/99 | 27.37 | 4062.98 | -0.35 | |
| 04/25/00 | 27.78 | 4062.57 | -0.41 | |
| 10/18/00 | 27.96 | 4062.39 | -0.18 | |
| 04/07/01 | 28.25 | 4062.10 | -0.29 | |
| 05/11/07 | 28.49 | 4061.86 | -0.24 | |

**WELL NO. BT-3**
**REFERENCE ELEVATION: 4069.31**
**REFERENCE POINT: TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 14.67 | 4054.64 | | |
| 07/19/90 | 15.70 | 4053.61 | -1.03 | |
| 10/04/94 | 13.68 | 4055.63 | 2.02 | |
| 01/30/95 | 12.66 | 4056.65 | 1.02 | |
| 02/27/95 | 12.04 | 4057.27 | 0.62 | |
| 03/27/95 | 12.33 | 4056.98 | -0.29 | |
| 04/28/95 | 12.94 | 4056.37 | -0.61 | |
| 05/26/95 | 12.79 | 4056.52 | 0.15 | |
| 06/30/95 | 11.83 | 4057.48 | 0.96 | |
| 07/31/95 | 12.16 | 4057.15 | -0.33 | |
| 08/22/95 | 12.42 | 4056.89 | -0.26 | |
| 09/30/95 | 12.75 | 4056.56 | -0.33 | |
| 10/31/95 | 12.92 | 4056.39 | -0.17 | |
| 11/28/95 | 13.00 | 4056.31 | -0.08 | |
| 12/26/95 | 13.08 | 4056.04 | -0.27 | Well re-surveyed new reference elev 4069.12 |
| 01/16/96 | 13.06 | 4056.06 | 0.02 | |
| 10/08/96 | 12.40 | 4056.72 | 0.66 | |
| 04/29/97 | 11.23 | 4057.89 | 1.17 | |
| 12/10/97 | 10.65 | 4058.47 | 0.58 | |
| 11/19/98 | 14.69 | 4054.43 | -4.04 | |
| 05/06/99 | 15.54 | 4053.58 | -0.85 | |
| 10/20/99 | 16.62 | 4052.50 | -1.08 | |
| 04/25/00 | 17.60 | 4051.52 | -0.98 | |
| 10/18/00 | 17.87 | 4051.25 | -0.27 | |
| 04/07/01 | 18.94 | 4050.18 | -1.07 | |
| 05/11/07 | NM | NM | NM | |

# BILLINGS REGIONAL LANDFILL
## Groundwater Elevation Data
### Maxim Project No. 9731068

**WELL NO. BT-4**
**REFERENCE ELEVATION: 4087.64**
**REFERENCE POINT: TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 16.62 | 4071.02 | | |
| 07/19/90 | 16.79 | 4070.85 | -0.17 | |
| 10/04/94 | 15.71 | 4071.93 | 1.08 | |
| 01/30/95 | 14.66 | 4072.98 | 1.05 | |
| 02/27/95 | 13.71 | 4073.93 | 0.95 | |
| 03/27/95 | 13.96 | 4073.68 | -0.25 | |
| 04/28/95 | 15.30 | 4072.34 | -1.34 | |
| 05/26/95 | 14.42 | 4073.22 | 0.88 | |
| 06/30/95 | 15.00 | 4072.64 | -0.58 | |
| 07/31/95 | 14.58 | 4073.06 | 0.42 | |
| 08/22/95 | 15.58 | 4072.06 | -1.00 | |
| 09/30/95 | 15.16 | 4072.48 | 0.42 | |
| 10/31/95 | 15.92 | 4071.72 | -0.76 | |
| 11/28/95 | 16.00 | 4071.64 | -0.08 | |
| 12/26/95 | 16.17 | 4071.28 | -0.36 | Well re-surveyed new reference elev 4087.45 |
| 01/16/96 | 16.04 | 4071.41 | 0.13 | |
| 10/08/96 | 15.51 | 4071.94 | 0.53 | |
| 04/29/97 | 15.31 | 4072.14 | 0.20 | |
| 12/10/97 | 15.68 | 4071.77 | -0.37 | |
| 11/19/98 | 16.34 | 4071.11 | -0.66 | |
| 05/06/99 | 16.93 | 4070.52 | -0.59 | |
| 10/20/99 | 17.07 | 4070.38 | -0.14 | |
| 04/25/00 | 17.42 | 4070.03 | -0.35 | |
| 10/18/00 | 17.88 | 4069.57 | -0.46 | |
| 04/07/01 | 18.31 | 4069.14 | -0.43 | |
| 05/11/07 | NM | NM | NM | |

**WELL NO. BT-5**
**REFERENCE ELEVATION: 4069.25**
**REFERENCE POINT: TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 07/19/90 | 18.45 | 4050.80 | | |
| 10/04/94 | 16.04 | 4053.21 | 2.41 | |
| 01/30/95 | 14.00 | 4055.25 | 2.04 | |
| 02/27/95 | 12.08 | 4057.17 | 1.92 | |
| 03/27/95 | 13.75 | 4055.50 | -1.67 | |
| 04/28/95 | 15.25 | 4054.00 | -1.50 | |
| 05/26/95 | 14.83 | 4054.42 | 0.42 | |
| 06/30/95 | 14.58 | 4054.67 | 0.25 | |
| 07/31/95 | 14.50 | 4054.75 | 0.08 | |
| 08/22/95 | 14.83 | 4054.42 | -0.33 | |
| 09/30/95 | 15.25 | 4054.00 | -0.42 | |
| 10/31/95 | 15.42 | 4053.83 | -0.17 | |
| 11/28/95 | 15.42 | 4053.83 | 0.00 | |
| 12/26/95 | 15.58 | 4053.38 | -0.45 | Well re-surveyed new reference elev 4068.96 |
| 01/16/96 | 15.55 | 4053.41 | 0.03 | |
| 10/08/96 | 14.71 | 4054.25 | 0.84 | |
| 04/29/97 | 13.47 | 4055.49 | 1.24 | |
| 12/10/97 | 12.97 | 4055.99 | 0.50 | |
| 11/19/98 | 16.99 | 4051.97 | -4.02 | |
| 05/06/99 | 17.60 | 4051.36 | -0.61 | |
| 10/20/99 | 18.82 | 4050.14 | -1.22 | |
| 04/25/00 | 19.24 | 4049.72 | -0.42 | |
| 10/18/00 | 20.38 | 4048.58 | -1.14 | |
| 04/07/01 | 20.69 | 4048.27 | -0.31 | |
| 05/11/07 | NM | NM | NM | |

# BILLINGS REGIONAL LANDFILL
## Groundwater Elevation Data
### Maxim Project No. 9731068

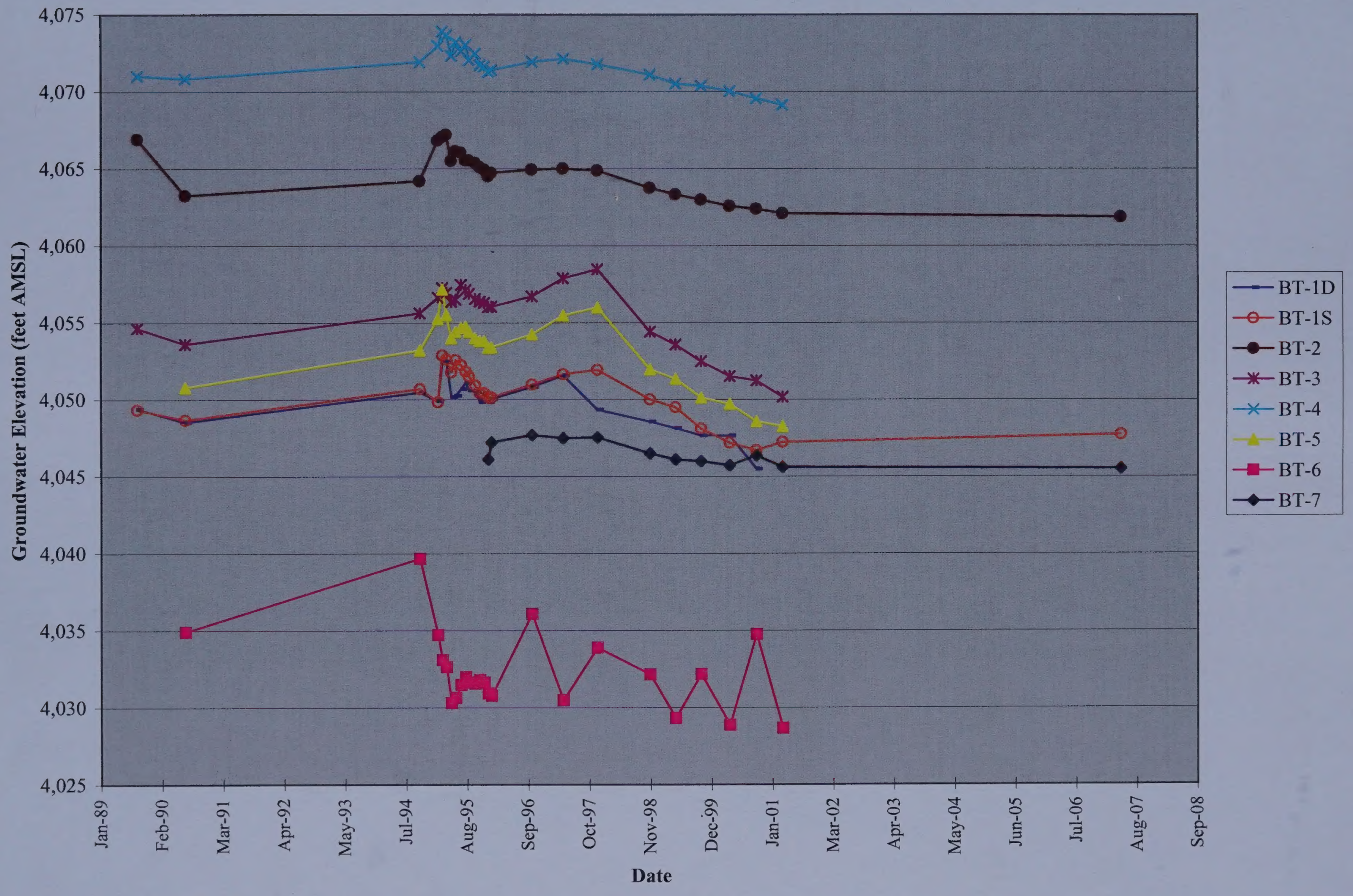
**WELL NO. BT-6**
**REFERENCE ELEVATION: 4057.57**
**REFERENCE POINT: TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 07/19/90 | 22.65 | 4034.92 | | |
| 10/04/94 | 17.88 | 4039.69 | 4.77 | |
| 01/30/95 | 22.83 | 4034.74 | -4.95 | |
| 02/27/95 | 24.46 | 4033.11 | -1.63 | |
| 03/27/95 | 24.92 | 4032.65 | -0.46 | |
| 04/28/95 | 27.25 | 4030.32 | -2.33 | |
| 05/26/95 | 26.92 | 4030.65 | 0.33 | |
| 06/30/95 | 26.08 | 4031.49 | 0.84 | |
| 07/31/95 | 25.58 | 4031.99 | 0.50 | |
| 08/22/95 | 25.92 | 4031.65 | -0.34 | |
| 09/30/95 | 26.00 | 4031.57 | -0.08 | |
| 10/31/95 | 25.75 | 4031.82 | 0.25 | |
| 11/28/95 | 25.92 | 4031.65 | -0.17 | |
| 12/26/95 | 26.75 | 4030.94 | -0.71 | Well re-surveyed new reference elev 4057.69 |
| 01/16/96 | 26.91 | 4030.78 | -0.16 | |
| 10/08/96 | 21.60 | 4036.09 | 5.31 | |
| 04/29/97 | 27.21 | 4030.48 | -5.61 | |
| 12/10/97 | 23.79 | 4033.90 | 3.42 | |
| 11/19/98 | 25.53 | 4032.16 | -1.74 | |
| 05/06/99 | 28.37 | 4029.32 | -2.84 | |
| 10/20/99 | 25.52 | 4032.17 | 2.85 | |
| 04/25/00 | 28.82 | 4028.87 | -3.30 | |
| 10/18/00 | 22.93 | 4034.76 | 5.89 | |
| 04/07/01 | 29.02 | 4028.67 | -6.09 | |
| 05/11/07 | NM | NM | NM | Well is dry |

**WELL NO. BT-7**
**REFERENCE ELEVATION: 4085.71**
**REFERENCE POINT: TOP OF PVC PIPE**

| DATE | DEPTH TO GROUNDWATER (ft.) | GROUNDWATER ELEVATION (MSL) | CHANGE IN GW ELEVATION (ft.) | COMMENTS |
|---|---|---|---|---|
| 12/26/95 | 39.58 | 4046.13 | | |
| 01/16/96 | 38.47 | 4047.24 | 1.11 | |
| 10/08/96 | 38.00 | 4047.71 | 0.47 | |
| 04/29/97 | 38.21 | 4047.50 | -0.21 | |
| 12/10/97 | 38.15 | 4047.56 | 0.06 | |
| 11/19/98 | 39.20 | 4046.51 | -1.05 | |
| 05/06/99 | 39.60 | 4046.11 | -0.40 | |
| 10/20/99 | 39.71 | 4046.00 | -0.11 | |
| 04/25/00 | 39.98 | 4045.73 | -0.27 | |
| 10/18/00 | 39.35 | 4046.36 | 0.63 | |
| 04/07/01 | 40.08 | 4045.63 | -0.73 | |
| 05/11/07 | 40.18 | 4045.53 | -0.10 | |

# BIG TIMBER SANITARY LANDFILL
## Groundwater Elevations



N:\TYPING\ENV-FAC\9731053\May 2007 GW rpt\Big Timber 2007 water level data

# APPENDIX C

# GROUNDWATER VELOCITY AND TRAVEL TIME CALCULATIONS

# Groundwater Velocity and Travel Time Calculations
# Big Timber Landfill
## April 27, 2001[1]

**VELOCITY**

Darcy's Law: $\upsilon = K\imath / \eta$

$\upsilon$ = interstitial velocity
$K$ = hydraulic conductivity
$\imath$ = hydraulic gradient
$\eta$ = effective porosity

$K$ = 0.31 to 0.85 feet/day (Chen-Northern, 1990)
$\imath$ = 0.067 (Figure 5)
$\eta$ = 0.20 (estimate; Chen-Northern, 1990)

Low Range

$$\upsilon = (0.31)(0.067) / 0.20 = 0.10 \text{ feet/day}$$

High Range

$$\upsilon = (0.85)(0.067) / 0.20 = 0.29 \text{ feet/day}$$

**TRAVEL TIME**

$T = d / \upsilon$

$T$ = groundwater travel time
$\upsilon$ = interstitial velocity
$d$ = average distance from landfill cell to downgradient well

$\upsilon$ = 0.10 to 0.29 feet/day
$d$ = 300 feet

Low Range

$$T = 300 / 0.10 = 3{,}000 \text{ days or } 8.2 \text{ years}$$

High Range

$$T = 300 / 0.29 = 1{,}034 \text{ days or } 2.8 \text{ years}$$

[1] Taken from: Maxim Technologies, Inc., 2001. April 2001 Groundwater Monitoring Results, Big Timber Sanitary Landfill, Big Timber, Montana. Report submitted to the City of Big Timber, Montana. August 9.

# APPENDIX D

# LABORATORY ANALYTICAL REPORT AND CHAIN-OF-CUSTODY

**NORTHERN**
**Analytical Laboratories, Inc.**

*602 South 25th Street*
*P O Box 30315*
*Billings, MT 59107*
*Telephone: (406) 254-7226*
*Fax: (406) 254-1389*

**REPORT TO:** ATTN: JEFF RICE
TETRA TECH, INC.
P.O. BOX 30615
BILLINGS, MT 59107

**DATE:** June 22, 2007
**JOB NUMBER:** 87-910
**PAGE:** 1 of 29
**INVOICE NO.:** 7050117

**REPORT OF:** Water Analysis – Big Timber Landfill

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**CASE NARRATIVE:**

On May 11, 2007, these water samples (laboratory numbers 2007050117-1 through -4) were received in our laboratory for analysis. A trip blank was present in the shipping container but not listed on the chain of custody. The trip blank was not analyzed. Tests were conducted in accordance with SW-846 *"Test Methods for Evaluating Solid Waste"*, 3rd Edition, updates I, II, IIA, IIB, III; EPA/600/4-79-020 *"Methods for Chemical Analysis of Water and Wastes"*; *"Standard Methods for the Examination of Water and Wastewater"*, 18th, 19th & 20th Editions; and EPA/600/R-93-100 *"Methods for the Determination of Inorganic Substances in Environmental Samples"*.

The results of the analysis are shown on the following pages. A < sign indicates the value reported was the method detection limit or the practical quantitation limit for the sample using the method described. Concentrations of analyte, if present, below this were not quantifiable. Sample results are not corrected for analyte blank concentrations. Values in brackets are the quality control limits for the associated quality control test. RPD is the abbreviation for relative percent difference.

The condition of the samples upon receipt at the laboratory is noted on the attached sample receipt checklist. Chain of custody documentation is enclosed.

Footnotes used in this report include the following:

B – The analyte was detected in the method blank. Sample concentrations flagged with a "B" may not represent the true sample concentration. The results are not corrected for the method blank concentration.

(3) The recovery or replication is outside the stated quality control limit. Corrective action was not required. The associated sample results do not require qualification.

Reviewed by ______________________
Denise Jensen – Quality Assurance Coordinator

Attachments: Chain of Custody
Sample Receipt Checklist

nct

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**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-1 **Description:** BT-2 **Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0515071022 | ----- | 8260B | 05/15/2007 |
| Acetone | <20 | ug/l | 8260B | 05/15/2007 |
| Acrylonitrile | <20 | ug/l | 8260B | 05/15/2007 |
| Benzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/15/2007 |
| Bromodichloromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Bromoform | <0.5 | ug/l | 8260B | 05/15/2007 |
| Bromomethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/15/2007 |
| Carbon tetrachloride | <0.5 | ug/l | 8260B | 05/15/2007 |
| Chlorobenzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Chloroethane | <1 | ug/l | 8260B | 05/15/2007 |
| Chloroform | <0.5 | ug/l | 8260B | 05/15/2007 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/15/2007 |
| Dibromochloromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dibromoethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Dibromomethane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/15/2007 |
| Dichlorodifluoromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| t-1,4-Dichloro-2-butene | <10 | ug/l | 8260B | 05/15/2007 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/15/2007 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1-Dichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| c-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| t-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichloropropane | <0.5 | ug/l | 8260B | 05/15/2007 |
| t-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/15/2007 |
| c-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/15/2007 |
| Ethylbenzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/15/2007 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/15/2007 |

**Client Name:** TETRA TECH, INC.
**Project No.:** NONE GIVEN
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-1 **Description:** BT-2 **Matrix:** WATER
**Date Received:** 05/11/2007
**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/15/2007 |
| Methylene chloride | <5 | ug/l | 8260B | 05/15/2007 |
| Styrene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,1,2,2-Tetrachloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Tetrachloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Toluene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1,1-Trichloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1,2-Trichloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Trichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Trichlorofluoromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/15/2007 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/15/2007 |
| Vinyl chloride | <0.5 | ug/l | 8260B | 05/15/2007 |
| Total Xylenes | <1.5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 109 | % [72-122] | 8260B | 05/15/2007 |
| Toluene-d8 (Surrogate) | 99 | % [89-112] | 8260B | 05/15/2007 |
| 4-Bromofluorobenzene (Surrogate) | 106 | % [86-114] | 8260B | 05/15/2007 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 45 | mg/l | 9056 | 06/01/2007 |
| Sulfate as SO4 | 152 | mg/l | 9056 | 05/30/2007 |
| Chemical Oxygen Demand | 14 | mg/l | 410.2 | 05/14/2007 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNE | 05/23/2007 |
| Electrical Conductivity | 606 | umhos/cm | 9050A | 05/24/2007 |
| Nitrate + Nitrite as N | 0.02 | mg/l | 353.2 | 06/05/2007 |
| pH | 8.6 | S.U. | 9040C | 05/11/2007 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 06/07/2007 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 06/07/2007 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6010B | 05/31/2007 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 06/07/2007 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 06/07/2007 |
| Copper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/31/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-1 **Description:** BT-2 **Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 06/07/2007 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 06/07/2007 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 06/07/2007 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 06/07/2007 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 06/13/2007 |
| Thallium as Tl (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6010B | 05/31/2007 |
| Zinc as Zn (Dissolved) | <0.01 | mg/l | 6010B | 05/31/2007 |
| Mercury Batch #/Digest Date | 687 | ----- | 7470A | 06/06/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-2 **Description:** BT-15 **Matrix:** WATER

**Date Received:** 05/11/2007

BT-15

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0515071023 | ----- | 8260B | 05/15/2007 |
| Acetone | <20 | ug/l | 8260B | 05/15/2007 |
| Acrylonitrile | <20 | ug/l | 8260B | 05/15/2007 |
| Benzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/15/2007 |
| Bromodichloromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Bromoform | <0.5 | ug/l | 8260B | 05/15/2007 |
| Bromomethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/15/2007 |
| Carbon tetrachloride | <0.5 | ug/l | 8260B | 05/15/2007 |
| Chlorobenzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Chloroethane | <1 | ug/l | 8260B | 05/15/2007 |
| Chloroform | <0.5 | ug/l | 8260B | 05/15/2007 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/15/2007 |
| Dibromochloromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dibromoethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Dibromomethane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/15/2007 |
| Dichlorodifluoromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| t-1,4-Dichloro-2-butene | <10 | ug/l | 8260B | 05/15/2007 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/15/2007 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1-Dichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| c-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| t-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichloropropane | <0.5 | ug/l | 8260B | 05/15/2007 |
| t-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/15/2007 |
| c-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/15/2007 |
| Ethylbenzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/15/2007 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/15/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-2 **Description:** BT-15 **Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/15/2007 |
| Methylene chloride | <5 | ug/l | 8260B | 05/15/2007 |
| Styrene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,1,2,2-Tetrachloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Tetrachloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Toluene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1,1-Trichloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1,2-Trichloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Trichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Trichlorofluoromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/15/2007 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/15/2007 |
| Vinyl chloride | <0.5 | ug/l | 8260B | 05/15/2007 |
| Total Xylenes | <1.5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 110 | % [72-122] | 8260B | 05/15/2007 |
| Toluene-d8 (Surrogate) | 99 | % [89-112] | 8260B | 05/15/2007 |
| 4-Bromofluorobenzene (Surrogate) | 98 | % [86-114] | 8260B | 05/15/2007 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 104 | mg/l | 9056 | 06/01/2007 |
| Sulfate as SO4 | 325 | mg/l | 9056 | 06/01/2007 |
| Chemical Oxygen Demand | 15 | mg/l | 410.2 | 05/14/2007 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNE | 05/23/2007 |
| Electrical Conductivity | 1380 | umhos/cm | 9050A | 05/24/2007 |
| Nitrate + Nitrite as N | 6.13 | mg/l | 353.2 | 06/05/2007 |
| pH | 8.8 | S.U. | 9040C | 05/11/2007 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 06/07/2007 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 06/07/2007 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6010B | 05/31/2007 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 06/07/2007 |
| Chromium as Cr (Dissolved) | 0.002 | mg/l | 6020 | 06/07/2007 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 06/07/2007 |
| Copper as Cu (Dissolved) | 0.002 | mg/l | 6020 | 06/07/2007 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/31/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-2 **Description:** BT-15 **Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 06/07/2007 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 06/07/2007 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 06/07/2007 |
| Selenium as Se (Dissolved) | 0.010 | mg/l | 6020 | 06/07/2007 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 06/13/2007 |
| Thallium as Tl (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6010B | 05/31/2007 |
| Zinc as Zn (Dissolved) | <0.01 | mg/l | 6010B | 05/31/2007 |
| Mercury Batch #/Digest Date | 687 | ----- | 7470A | 06/06/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-3 **Description:** BT-101 **Matrix:** WATER

BT-15 Dup

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0518071009 | ----- | 8260B | |
| Acetone | <20 | ug/l | 8260B | 05/18/2007 |
| Acrylonitrile | <20 | ug/l | 8260B | 05/18/2007 |
| Benzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/18/2007 |
| Bromodichloromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Bromoform | <0.5 | ug/l | 8260B | 05/18/2007 |
| Bromomethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/18/2007 |
| Carbon tetrachloride | <0.5 | ug/l | 8260B | 05/18/2007 |
| Chlorobenzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Chloroethane | <1 | ug/l | 8260B | 05/18/2007 |
| Chloroform | <0.5 | ug/l | 8260B | 05/18/2007 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/18/2007 |
| Dibromochloromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dibromoethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Dibromomethane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/18/2007 |
| Dichlorodifluoromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| t-1,4-Dichloro-2-butene | <10 | ug/l | 8260B | 05/18/2007 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/18/2007 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1-Dichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| c-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| t-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichloropropane | <0.5 | ug/l | 8260B | 05/18/2007 |
| t-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/18/2007 |
| c-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/18/2007 |
| Ethylbenzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/18/2007 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/18/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-3 **Description:** BT-101 **Matrix:** WATER
**Date Received:** 05/11/2007
**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/18/2007 |
| Methylene chloride | <5 | ug/l | 8260B | 05/18/2007 |
| Styrene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,1,2,2-Tetrachloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Tetrachloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Toluene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1,1-Trichloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1,2-Trichloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Trichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Trichlorofluoromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/18/2007 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/18/2007 |
| Vinyl chloride | <0.5 | ug/l | 8260B | 05/18/2007 |
| Total Xylenes | <1.5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 111 | % [72-122] | 8260B | 05/18/2007 |
| Toluene-d8 (Surrogate) | 99 | % [89-112] | 8260B | 05/18/2007 |
| 4-Bromofluorobenzene (Surrogate) | 106 | % [86-114] | 8260B | 05/18/2007 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 102 | mg/l | 9056 | 06/01/2007 |
| Sulfate as SO4 | 322 | mg/l | 9056 | 06/01/2007 |
| Chemical Oxygen Demand | 24 | mg/l | 410.2 | 05/14/2007 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNE | 05/23/2007 |
| Electrical Conductivity | 1380 | umhos/cm | 9050A | 05/24/2007 |
| Nitrate + Nitrite as N | 6.10 | mg/l | 353.2 | 06/05/2007 |
| pH | 7.8 | S.U. | 9040C | 05/11/2007 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 06/07/2007 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 06/07/2007 |
| Barium as Ba (Dissolved) | 0.02 | mg/l | 6010B | 05/31/2007 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 06/07/2007 |
| Chromium as Cr (Dissolved) | 0.002 | mg/l | 6020 | 06/07/2007 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 06/07/2007 |
| Copper as Cu (Dissolved) | 0.008 | mg/l | 6020 | 06/07/2007 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/31/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-3 **Description:** BT-101 **Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 06/07/2007 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 06/07/2007 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 06/07/2007 |
| Selenium as Se (Dissolved) | 0.011 | mg/l | 6020 | 06/07/2007 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 06/13/2007 |
| Thallium as Tl (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6010B | 05/31/2007 |
| Zinc as Zn (Dissolved) | <0.01 | mg/l | 6010B | 05/31/2007 |
| Mercury Batch #/Digest Date | 687 | ----- | 7470A | 06/06/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-4 **Description:** BT-7 **Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0518071017 | ---- | 8260B | |
| Acetone | <20 | ug/l | 8260B | 05/18/2007 |
| Acrylonitrile | <20 | ug/l | 8260B | 05/18/2007 |
| Benzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/18/2007 |
| Bromodichloromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Bromoform | <0.5 | ug/l | 8260B | 05/18/2007 |
| Bromomethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/18/2007 |
| Carbon tetrachloride | <0.5 | ug/l | 8260B | 05/18/2007 |
| Chlorobenzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Chloroethane | <1 | ug/l | 8260B | 05/18/2007 |
| Chloroform | <0.5 | ug/l | 8260B | 05/18/2007 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/18/2007 |
| Dibromochloromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dibromoethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Dibromomethane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/18/2007 |
| Dichlorodifluoromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| t-1,4-Dichloro-2-butene | <10 | ug/l | 8260B | 05/18/2007 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/18/2007 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1-Dichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| c-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| t-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichloropropane | <0.5 | ug/l | 8260B | 05/18/2007 |
| t-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/18/2007 |
| c-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/18/2007 |
| Ethylbenzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/18/2007 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/18/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-4 **Description:** BT-7 **Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/18/2007 |
| Methylene chloride | <5 | ug/l | 8260B | 05/18/2007 |
| Styrene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,1,2,2-Tetrachloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Tetrachloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Toluene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1,1-Trichloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1,2-Trichloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Trichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Trichlorofluoromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/18/2007 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/18/2007 |
| Vinyl chloride | <0.5 | ug/l | 8260B | 05/18/2007 |
| Total Xylenes | <1.5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 112 | % [72-122] | 8260B | 05/18/2007 |
| Toluene-d8 (Surrogate) | 100 | % [89-112] | 8260B | 05/18/2007 |
| 4-Bromofluorobenzene (Surrogate) | 105 | % [86-114] | 8260B | 05/18/2007 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 170 | mg/l | 9056 | 06/01/2007 |
| Sulfate as SO4 | 233 | mg/l | 9056 | 05/30/2007 |
| Chemical Oxygen Demand | 29 | mg/l | 410.2 | 05/14/2007 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNE | 05/23/2007 |
| Electrical Conductivity | 1290 | umhos/cm | 9050A | 05/24/2007 |
| Nitrate + Nitrite as N | 0.04 | mg/l | 353.2 | 06/05/2007 |
| pH | 7.6 | S.U. | 9040C | 05/11/2007 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 06/07/2007 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 06/07/2007 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6010B | 05/31/2007 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 06/07/2007 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 06/07/2007 |
| Copper as Cu (Dissolved) | 0.002 | mg/l | 6020 | 06/07/2007 |
| Iron as Fe (Dissolved) | 0.06 | mg/l | 6010B | 05/31/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-4 **Description:** BT-7 **Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Lead as Pb (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 06/07/2007 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 06/07/2007 |
| Selenium as Se (Dissolved) | 0.007 | mg/l | 6020 | 06/07/2007 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 06/13/2007 |
| Thallium as Tl (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6010B | 05/31/2007 |
| Zinc as Zn (Dissolved) | <0.01 | mg/l | 6010B | 05/31/2007 |
| Mercury Batch #/Digest Date | 687 | ---- | 7470A | 06/06/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-6 **Description:** MATRIX SPIKE OF 2007050117-1 **Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007 **Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 107 | % [80-120] | 9056 | 06/01/2007 |
| Sulfate as SO4 | 92 | % [80-120] | 9056 | 05/30/2007 |
| Chemical Oxygen Demand | 98 | % [76-119] | 410.2 | 05/14/2007 |
| Cyanide as CN (Total) | 67 | % [54-131] | 4500CNE | 05/23/2007 |
| Electrical Conductivity | NA | ----- | ----- | ----- |
| Nitrate + Nitrite as N | 94 | % [85-114] | 353.2 | 06/05/2007 |
| pH | NA | ----- | ----- | ----- |
| Antimony as Sb (Dissolved) | 110 | % [72-128] | 6020 | 06/07/2007 |
| Arsenic as As (Dissolved) | 107 | % [74-124] | 6020 | 06/07/2007 |
| Barium as Ba (Dissolved) | 98 | % [75-125] | 6010B | 05/31/2007 |
| Beryllium as Be (Dissolved) | 99 | % [71-131] | 6020 | 06/07/2007 |
| Cadmium as Cd (Dissolved) | 107 | % [81-114] | 6020 | 06/07/2007 |
| Chromium as Cr (Dissolved) | 102 | % [73-117] | 6020 | 06/07/2007 |
| Cobalt as Co (Dissolved) | 100 | % [76-116] | 6020 | 06/07/2007 |
| Copper as Cu (Dissolved) | 110 | % [67-118] | 6020 | 06/07/2007 |
| Iron as Fe (Dissolved) | 101 | % [84-115] | 6010B | 05/31/2007 |
| Lead as Pb (Dissolved) | 111 | % [75-122] | 6020 | 06/07/2007 |
| Mercury as Hg (Dissolved) | 110 | % [59-126] | 7470A | 06/07/2007 |
| Nickel as Ni (Dissolved) | 97 | % [69-124] | 6020 | 06/07/2007 |
| Selenium as Se (Dissolved) | 100 | % [70-130] | 6020 | 06/07/2007 |
| Silver as Ag (Dissolved) | 104 | % [70-119] | 6020 | 06/13/2007 |
| Thallium as Tl (Dissolved) | 111 | % [78-127] | 6020 | 06/07/2007 |
| Vanadium as V (Dissolved) | 99 | % [75-125] | 6010B | 05/31/2007 |
| Zinc as Zn (Dissolved) | 104 | % [80-124] | 6010B | 05/31/2007 |
| Mercury Batch #/Digest Date | 687 | ----- | 7470A | 06/06/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-7
**Description:** MATRIX SPIKE DUPLICATE OF 2007050117-1
**Matrix:** WATER

**Date Received:** 05/11/2007

**Date Collected:** 05/11/2007
**Collected by:** RYAN SPARHAWK

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 2 | RPD [0-20] | 9056 | 06/01/2007 |
| Sulfate as SO4 | 0 | RPD [0-20] | 9056 | 05/30/2007 |
| Chemical Oxygen Demand | 2 | RPD [0-20] | 410.2 | 05/14/2007 |
| Cyanide as CN (Total) | 4 | RPD [0-20] | 4500CNE | 05/23/2007 |
| Electrical Conductivity | NA | ----- | ----- | ----- |
| Nitrate + Nitrite as N | 0 | RPD [0-20] | 353.2 | 06/05/2007 |
| pH | NA | ----- | ----- | ----- |
| Antimony as Sb (Dissolved) | 6 | RPD [0-20] | 6020 | 06/07/2007 |
| Arsenic as As (Dissolved) | 6 | RPD [0-20] | 6020 | 06/07/2007 |
| Barium as Ba (Dissolved) | 0 | RPD [0-20] | 6010B | 05/31/2007 |
| Beryllium as Be (Dissolved) | 6 | RPD [0-20] | 6020 | 06/07/2007 |
| Cadmium as Cd (Dissolved) | 4 | RPD [0-20] | 6020 | 06/07/2007 |
| Chromium as Cr (Dissolved) | 6 | RPD [0-20] | 6020 | 06/07/2007 |
| Cobalt as Co (Dissolved) | 5 | RPD [0-20] | 6020 | 06/07/2007 |
| Copper as Cu (Dissolved) | 12 | RPD [0-20] | 6020 | 06/07/2007 |
| Iron as Fe (Dissolved) | 1 | RPD [0-20] | 6010B | 05/31/2007 |
| Lead as Pb (Dissolved) | 3 | RPD [0-20] | 6020 | 06/07/2007 |
| Mercury as Hg (Dissolved) | 2 | RPD [0-20] | 7470A | 06/07/2007 |
| Nickel as Ni (Dissolved) | 5 | RPD [0-20] | 6020 | 06/07/2007 |
| Selenium as Se (Dissolved) | 6 | RPD [0-20] | 6020 | 06/07/2007 |
| Silver as Ag (Dissolved) | 0 | RPD [0-20] | 6020 | 06/13/2007 |
| Thallium as Tl (Dissolved) | 4 | RPD [0-20] | 6020 | 06/07/2007 |
| Vanadium as V (Dissolved) | 1 | RPD [0-20] | 6010B | 05/31/2007 |
| Zinc as Zn (Dissolved) | 1 | RPD [0-20] | 6010B | 05/31/2007 |
| Mercury Batch #/Digest Date | 687 | ----- | 7470A | 06/06/2007 |

**Client Name:** TETRA TECH, INC.
**Project No.:** NONE GIVEN
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-8 **Description:** METHOD BLANK **Matrix:** WATER
**Date Received:** -----
**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | <1 | mg/l | 9056 | 05/31/2007 |
| Sulfate as SO4 | <5 | mg/l | 9056 | 05/30/2007 |
| Chemical Oxygen Demand | <5 | mg/l | 410.2 | 05/14/2007 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNE | 05/23/2007 |
| Electrical Conductivity | <10 | umhos/cm | 9050A | 05/24/2007 |
| Nitrate + Nitrite as N | <0.01 | mg/l | 353.2 | 06/05/2007 |
| pH | NA | ----- | ----- | ----- |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 06/07/2007 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 06/07/2007 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6010B | 05/31/2007 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 06/07/2007 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 06/07/2007 |
| Copper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/31/2007 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 06/07/2007 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 06/06/2007 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 06/07/2007 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 06/07/2007 |
| Silver as Ag (Dissolved) | 0.0010 B | mg/l | 6020 | 06/13/2007 |
| Thallium as Tl (Dissolved) | <0.001 | mg/l | 6020 | 06/07/2007 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6010B | 05/31/2007 |
| Zinc as Zn (Dissolved) | <0.01 | mg/l | 6010B | 05/31/2007 |
| Mercury Batch #/Digest Date | 687 | ----- | 7470A | 06/06/2007 |

**Client Name:** TETRA TECH, INC.

**Project No.:** NONE GIVEN

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2007050117-9 **Description:** LABORATORY CONTROL SAMPLE **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 105 | % [90-110] | 9056 | 05/31/2007 |
| Sulfate as SO4 | 101 | % [90-110] | 9056 | 05/30/2007 |
| Chemical Oxygen Demand | 89 | % [82-111] | 410.2 | 05/14/2007 |
| Cyanide as CN (Total) | 102 | % [76-113] | 4500CNE | 05/23/2007 |
| Electrical Conductivity | 99 | % [91-108] | 9050A | 05/24/2007 |
| Nitrate + Nitrite as N | 100 | % [94-108] | 353.2 | 06/05/2007 |
| pH | 100 | % [99-101] | 9040C | 05/11/2007 |
| Antimony as Sb (Dissolved) | 107 | % [81-120] | 6020 | 06/07/2007 |
| Arsenic as As (Dissolved) | 91 | % [76-116] | 6020 | 06/07/2007 |
| Barium as Ba (Dissolved) | 105 | % [85-115] | 6010B | 05/31/2007 |
| Beryllium as Be (Dissolved) | 102 | % [84-120] | 6020 | 06/07/2007 |
| Cadmium as Cd (Dissolved) | 105 | % [82-113] | 6020 | 06/07/2007 |
| Chromium as Cr (Dissolved) | 103 | % [82-116] | 6020 | 06/07/2007 |
| Cobalt as Co (Dissolved) | 99 | % [82-118] | 6020 | 06/07/2007 |
| Copper as Cu (Dissolved) | 102 | % [81-116] | 6020 | 06/07/2007 |
| Iron as Fe (Dissolved) | 102 | % [92-111] | 6010B | 05/31/2007 |
| Lead as Pb (Dissolved) | 112 | % [81-116] | 6020 | 06/07/2007 |
| Mercury as Hg (Dissolved) | 107 | % [84-118] | 7470A | 06/06/2007 |
| Nickel as Ni (Dissolved) | 97 | % [81-117] | 6020 | 06/07/2007 |
| Selenium as Se (Dissolved) | 94 | % [81-116] | 6020 | 06/07/2007 |
| Silver as Ag (Dissolved) | 106 | % [85-114] | 6020 | 06/13/2007 |
| Thallium as Tl (Dissolved) | 111 | % [85-118] | 6020 | 06/07/2007 |
| Vanadium as V (Dissolved) | 100 | % [85-115] | 6010B | 05/31/2007 |
| Zinc as Zn (Dissolved) | 103 | % [89-117] | 6010B | 05/31/2007 |
| Mercury Batch #/Digest Date | 687 | ----- | 7470A | 06/06/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-29 **Description:** METHOD BLANK, 5/15/07 BATCH **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **VOLATILE ORGANIC COMPOUNDS EXTENDED LIST** | | | | |
| Data File Number-Volatiles | 0515071003 | ---- | 8260B | 05/15/2007 |
| Acetone | <20 | ug/l | 8260B | 05/15/2007 |
| Acrylonitrile | <20 | ug/l | 8260B | 05/15/2007 |
| Benzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Bromobenzene | <1 | ug/l | 8260B | 05/15/2007 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/15/2007 |
| Bromodichloromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Bromoform | <0.5 | ug/l | 8260B | 05/15/2007 |
| Bromomethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| n-Butylbenzene | <1 | ug/l | 8260B | 05/15/2007 |
| sec-Butylbenzene | <1 | ug/l | 8260B | 05/15/2007 |
| t-Butylbenzene | <1 | ug/l | 8260B | 05/15/2007 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/15/2007 |
| Carbon tetrachloride | <0.5 | ug/l | 8260B | 05/15/2007 |
| Chlorobenzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Chloroethane | <1 | ug/l | 8260B | 05/15/2007 |
| Chloroform | <0.5 | ug/l | 8260B | 05/15/2007 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/15/2007 |
| 2-Chlorotoluene | <1 | ug/l | 8260B | 05/15/2007 |
| 4-Chlorotoluene | <1 | ug/l | 8260B | 05/15/2007 |
| Dibromochloromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dibromoethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Dibromomethane | <1 | ug/l | 8260B | 05/15/2007 |
| Dichlorodifluoromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/15/2007 |
| t-1,4-Dichloro-2-butene | <10 | ug/l | 8260B | 05/15/2007 |
| 1,3-Dichlorobenzene | <1 | ug/l | 8260B | 05/15/2007 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/15/2007 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,2-Dichloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1-Dichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| c-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| t-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-29 **Description:** METHOD BLANK, 5/15/07 BATCH **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| 1,2-Dichloropropane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,3-Dichloropropane | <1 | ug/l | 8260B | 05/15/2007 |
| 2,2-Dichloropropane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,1-Dichloropropene | <1 | ug/l | 8260B | 05/15/2007 |
| c-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/15/2007 |
| t-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Ethylmethacrylate | <5 | ug/l | 8260B | 05/15/2007 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/15/2007 |
| Ethylbenzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/15/2007 |
| Hexachlorobutadiene | <1 | ug/l | 8260B | 05/15/2007 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/15/2007 |
| Cumene (Isopropylbenzene) | <1 | ug/l | 8260B | 05/15/2007 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/15/2007 |
| Isopropyltoluene | <1 | ug/l | 8260B | 05/15/2007 |
| Methylene chloride | <5 | ug/l | 8260B | 05/15/2007 |
| Methyl-tert-butyl ether | <1 | ug/l | 8260B | 05/15/2007 |
| Naphthalene | <5 | ug/l | 8260B | 05/15/2007 |
| Styrene | <0.5 | ug/l | 8260B | 05/15/2007 |
| n-Propylbenzene | <1 | ug/l | 8260B | 05/15/2007 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,1,2,2-Tetrachloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Tetrachloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Toluene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2,3-Trichlorobenzene | <1 | ug/l | 8260B | 05/15/2007 |
| 1,2,4-Trichlorobenzene | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1,1-Trichloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,1,2-Trichloroethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| Trichloroethene | <0.5 | ug/l | 8260B | 05/15/2007 |
| Trichlorofluoromethane | <0.5 | ug/l | 8260B | 05/15/2007 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/15/2007 |
| 1,2,4-Trimethylbenzene | <1 | ug/l | 8260B | 05/15/2007 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/15/2007 |
| 1,3,5-Trimethylbenzene | <1 | ug/l | 8260B | 05/15/2007 |
| Vinyl chloride | <0.5 | ug/l | 8260B | 05/15/2007 |
| Total Xylenes | <1.5 | ug/l | 8260B | 05/15/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-29 **Description:** METHOD BLANK, 5/15/07 BATCH **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surrogate) | 108 | % [72-122] | 8260B | 05/15/2007 |
| Toluene-d8 (Surrogate) | 100 | % [89-112] | 8260B | 05/15/2007 |
| 4-Bromofluorobenzene (Surrogate) | 105 | % [86-114] | 8260B | 05/15/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-30 **Description:** LABORATORY CONTROL SAMPLE, 5/15/07 BATCH **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **VOLATILE ORGANIC COMPOUNDS** | | | | |
| Data File Number-Volatiles | 0515071004 | ----- | 8260B | 05/15/2007 |
| Benzene | 109 | % [80-116] | 8260B | 05/15/2007 |
| Chlorobenzene | 98 | % [82-109] | 8260B | 05/15/2007 |
| 1,1-Dichloroethene | 108 | % [60-115] | 8260B | 05/15/2007 |
| Toluene | 105 | % [79-111] | 8260B | 05/15/2007 |
| Trichloroethene | 97 | % [76-109] | 8260B | 05/15/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 108 | % [72-122] | 8260B | 05/15/2007 |
| Toluene-d8 (Surrogate) | 101 | % [89-112] | 8260B | 05/15/2007 |
| 4-Bromofluorobenzene (Surrogate) | 105 | % [86-114] | 8260B | 05/15/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-31 **Description:** MATRIX SPIKE OF 2007050082-8, 5/15/07 BATCH **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** CLIENT

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **VOLATILE ORGANIC COMPOUNDS** | | | | |
| Data File Number-Volatiles | 0515071011 | ----- | 8260B | 05/15/2007 |
| Benzene | 112 | % [70-126] | 8260B | 05/15/2007 |
| Chlorobenzene | 101 | % [84-108] | 8260B | 05/15/2007 |
| 1,1-Dichloroethene | 109 | % [57-119] | 8260B | 05/15/2007 |
| Toluene | 109 | % [78-114] | 8260B | 05/15/2007 |
| Trichloroethene | 101 | % [77-107] | 8260B | 05/15/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 106 | % [72-122] | 8260B | 05/15/2007 |
| Toluene-d8 (Surrogate) | 102 | % [89-112] | 8260B | 05/15/2007 |
| 4-Bromofluorobenzene (Surrogate) | 105 | % [86-114] | 8260B | 05/15/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-32 **Description:** MATRIX SPIKE DUPLICATE OF 5007050082-8, 5/15/07 BATCH **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** CLIENT

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **VOLATILE ORGANIC COMPOUNDS** | | | | |
| Data File Number-Volatiles | 0515071012 | ----- | 8260B | 05/15/2007 |
| Benzene | 1 | RPD [0-20] | 8260B | 05/15/2007 |
| Chlorobenzene | 0 | RPD [0-20] | 8260B | 05/15/2007 |
| 1,1-Dichloroethene | 3 | RPD [0-20] | 8260B | 05/15/2007 |
| Toluene | 2 | RPD [0-20] | 8260B | 05/15/2007 |
| Trichloroethene | 2 | RPD [0-20] | 8260B | 05/15/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 102 | % [72-122] | 8260B | 05/15/2007 |
| Toluene-d8 (Surrogate) | 100 | % [89-112] | 8260B | 05/15/2007 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % [86-114] | 8260B | 05/15/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-61 **Description:** METHOD BLANK; 5/18/07 BATCH **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **VOLATILE ORGANIC COMPOUNDS** | | | | |
| Data File Number-Volatiles | 0518071005 | ----- | 8260B | |
| Acetone | <20 | ug/l | 8260B | 05/18/2007 |
| Acrylonitrile | <20 | ug/l | 8260B | 05/18/2007 |
| Benzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Bromobenzene | <1 | ug/l | 8260B | 05/18/2007 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/18/2007 |
| Bromodichloromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Bromoform | <0.5 | ug/l | 8260B | 05/18/2007 |
| Bromomethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| n-Butylbenzene | <1 | ug/l | 8260B | 05/18/2007 |
| sec-Butylbenzene | <1 | ug/l | 8260B | 05/18/2007 |
| t-Butylbenzene | <1 | ug/l | 8260B | 05/18/2007 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/18/2007 |
| Carbon tetrachloride | <0.5 | ug/l | 8260B | 05/18/2007 |
| Chlorobenzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Chloroethane | <1 | ug/l | 8260B | 05/18/2007 |
| Chloroform | <0.5 | ug/l | 8260B | 05/18/2007 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/18/2007 |
| 2-Chlorotoluene | <1 | ug/l | 8260B | 05/18/2007 |
| 4-Chlorotoluene | <1 | ug/l | 8260B | 05/18/2007 |
| Dibromochloromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dibromoethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Dibromomethane | <1 | ug/l | 8260B | 05/18/2007 |
| Dichlorodifluoromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/18/2007 |
| 1,3-Dichlorobenzene | <1 | ug/l | 8260B | 05/18/2007 |
| t-1,4-Dichloro-2-butene | <10 | ug/l | 8260B | 05/18/2007 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/18/2007 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,2-Dichloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1-Dichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| c-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| t-1,2-Dichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-61 **Description:** METHOD BLANK; 5/18/07 BATCH **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| 1,2-Dichloropropane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,3-Dichloropropane | <1 | ug/l | 8260B | 05/18/2007 |
| 2,2-Dichloropropane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,1-Dichloropropene | <1 | ug/l | 8260B | 05/18/2007 |
| c-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/18/2007 |
| t-1,3-Dichloropropene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Ethylmethacrylate | <5 | ug/l | 8260B | 05/18/2007 |
| Ethylbenzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/18/2007 |
| Hexachlorobutadiene | <1 | ug/l | 8260B | 05/18/2007 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/18/2007 |
| Cumene (Isopropylbenzene) | <1 | ug/l | 8260B | 05/18/2007 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/18/2007 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/18/2007 |
| Isopropyltoluene | <1 | ug/l | 8260B | 05/18/2007 |
| Methylene chloride | <5 | ug/l | 8260B | 05/18/2007 |
| Methyl-tert-butyl ether | <1 | ug/l | 8260B | 05/18/2007 |
| Naphthalene | <5 | ug/l | 8260B | 05/18/2007 |
| n-Propylbenzene | <1 | ug/l | 8260B | 05/18/2007 |
| Styrene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,1,2,2-Tetrachloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Tetrachloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Toluene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2,3-Trichlorobenzene | <1 | ug/l | 8260B | 05/18/2007 |
| 1,2,4-Trichlorobenzene | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1,1-Trichloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,1,2-Trichloroethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| Trichloroethene | <0.5 | ug/l | 8260B | 05/18/2007 |
| Trichlorofluoromethane | <0.5 | ug/l | 8260B | 05/18/2007 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/18/2007 |
| 1,2,4-Trimethylbenzene | <1 | ug/l | 8260B | 05/18/2007 |
| 1,3,5-Trimethylbenzene | <1 | ug/l | 8260B | 05/18/2007 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/18/2007 |
| Vinyl chloride | <0.5 | ug/l | 8260B | 05/18/2007 |
| Total Xylenes | <1.5 | ug/l | 8260B | 05/18/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-61 **Description:** METHOD BLANK; 5/18/07 BATCH **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surrogate) | 114 | % [72-122] | 8260B | 05/18/2007 |
| Toluene-d8 (Surrogate) | 101 | % [89-112] | 8260B | 05/18/2007 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % [86-114] | 8260B | 05/18/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-62 **Description:** LABORATORY CONTROL SAMPLE; BATCH 5/18/07 **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** PREPARED BY LAB

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **VOLATILE ORGANIC COMPOUNDS** | | | | |
| Data File Number-Volatiles | 0518071004 | ----- | 8260B | |
| Benzene | 90 | % [80-116] | 8260B | 05/18/2007 |
| Chlorobenzene | 86 | % [82-109] | 8260B | 05/18/2007 |
| 1,1-Dichloroethene | 86 | % [60-115] | 8260B | 05/18/2007 |
| Toluene | 88 | % [79-111] | 8260B | 05/18/2007 |
| Trichloroethene | 86 | % [76-109] | 8260B | 05/18/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 107 | % [72-122] | 8260B | 05/18/2007 |
| Toluene-d8 (Surrogate) | 99 | % [89-112] | 8260B | 05/18/2007 |
| 4-Bromofluorobenzene (Surrogate) | 106 | % [86-114] | 8260B | 05/18/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-63

**Description:** MATRIX SPIKE OF 2007050117-3; BATCH 5/18/07

**Matrix:** WATER

**Date Received:** -----

**Date Collected:** -----

**Collected by:** CLIENT

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **VOLATILE ORGANIC COMPOUNDS** | | | | |
| Data File Number-Volatiles | 0518071011 | ----- | 8260B | |
| Benzene | 91 | % [80-116] | 8260B | 05/18/2007 |
| Chlorobenzene | 86 | % [82-109] | 8260B | 05/18/2007 |
| 1,1-Dichloroethene | 122 (3) | % [60-115] | 8260B | 05/18/2007 |
| Toluene | 88 | % [79-111] | 8260B | 05/18/2007 |
| Trichloroethene | 87 | % [76-109] | 8260B | 05/18/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 114 | % [72-122] | 8260B | 05/18/2007 |
| Toluene-d8 (Surrogate) | 98 | % [89-112] | 8260B | 05/18/2007 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % [86-114] | 8260B | 05/18/2007 |

**Client Name:** QUALITY CONTROL

**Project No.:** 59-100

**Project Name:** 8260 QUALITY CONTROL

**Sample No.:** 2007050003-64 **Description:** MATRIX SPIKE DUPLICATE OF 2007050117-3; BATCH 5/18/07 **Matrix:** WATER

**Date Received:** -----

**Date Collected:** ----- **Collected by:** CLIENT

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **VOLATILE ORGANIC COMPOUNDS** | | | | |
| Data File Number-Volatiles | 0518071012 | ----- | 8260B | |
| Benzene | 6 | RPD [0-20] | 8260B | 05/18/2007 |
| Chlorobenzene | 4 | RPD [0-20] | 8260B | 05/18/2007 |
| 1,1-Dichloroethene | 35 (3) | RPD [0-20] | 8260B | 05/18/2007 |
| Toluene | 5 | RPD [0-20] | 8260B | 05/18/2007 |
| Trichloroethene | 6 | RPD [0-20] | 8260B | 05/18/2007 |
| 1,2-Dichloroethane-d4 (Surrogate) | 105 | % [72-122] | 8260B | 05/18/2007 |
| Toluene-d8 (Surrogate) | 98 | % [89-112] | 8260B | 05/18/2007 |
| 4-Bromofluorobenzene (Surrogate) | 100 | % [86-114] | 8260B | 05/18/2007 |

Big Timber Landfill
Project or Site Name

Project Number

Ryan Sparhawk
Sampler Name (Printed)

J. Rice
Project Manager, Report to

# CHAIN OF CUSTODY RECORD

**NORTHERN**
**Analytical Laboratories, Inc.**

602 South 25th Street
Billings, Montana 59101
Ph: 406-254-7226 · Fax: 406-254-1389
nlabs@wtp.net

Tetra Tech
Report to (Firm or Agency)

Address

Billings
City State Zip

406 248 9161
Phone Fax

| DATE COLLECTED | TIME COLLECTED | SAMPLE LOCATION OR DESCRIPTION | COMP OR GRAB | SAMPLE MATRIX | NO. OF CONTAINERS | ANALYSIS REQUIRED<br>VOC's | <br>Cyanide | <br>Nutrients | <br>Common Ions | <br>Dissolved metals | | | NOTES | 2007 ✓ LAB NUMBER 050117 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5-11-07 | 1130 | BT-2 | G | W | 7 | X | X | X | X | X | | | | 1 |
| 5-11-07 | 1226 | BT-1S | G | W | 7 | X | X | X | X | X | | | | 2 |
| 5-11-07 | 1226 | BT-101 | G | W | 7 | X | X | X | X | X | | | | 3 |
| 5-11-07 | 1313 | BT-7 | G | W | 7 | X | X | X | X | X | | | | 4 |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | Trip Blank | G | W | 2 | | | | | | | | | 5 |
| | | | | | | | | | | | | | MS | 6 |
| | | | | | | | | | | | | | MSD | 7 |
| | | | | | | | | | | | | | MB | 8 |
| | | | | | | | | | | | | | LCS | 9 |
| | | | | | | | | | | | | | | |

| Relinquished by: | Date | Time | Received by: |
|---|---|---|---|
| Ryan Sparhawk | 5-11 | 1600 | Norma C. Trankle |
| Relinquished by: | Date | Time | Received by: |
| Relinquished by: | Date | Time | Received by: |

**NORTHERN**
**Analytical Laboratories, Inc.**

# SAMPLE RECEIPT CHECKLIST

Dear Valued Client: This checklist documents the condition of your sample(s) as it (they) arrived at our lab. Please review it and familiarize yourself with its contents. Should you have any questions or comments, please contact us. Thank you for your use of our services.

Client Name TT-Begs
Project Big Timber L.F.
Laboratory Number(s) 050117
Checklist Completed by MW 5/11/07 (Initials / Date)

Date/Time Received 5/11/07 1600 (Date / Time)
Received by NT
Carrier Name HAND
Sample Type $H_2O$

| | YES | NO |
|---|---|---|
| 1. Shipping container in good condition? | ✓ | |
| 2. Custody seals present on shipping container?<br>Condition: Intact ____ Broken ____ | | ✓ |
| 3. Chain of custody present? | ✓ | |
| 4. Chain of custody signed when relinquished and received? | ✓ | |
| 5. Chain of custody agrees with sample labels? | ✓ | |
| 6. Custody seals on sample bottles?<br>Condition: Intact ____ Broken ____ | | ✓ |
| 7. Samples in proper container/bottle?* | ✓ | |
| 8. Sample containers intact?* | ✓ | |
| 9. Sufficient sample volume for indicated test?* | ✓ | |
| 10. [✓ Ice]/Frozen Blue Ice present in shipping container? (circle one)<br>container temperature 1. 1.8°C 2. ____ 3. ____<br>* (if <0 or>10) | ✓ | |
| 11. All samples rec'd within holding time?* | ✓ | |
| 12. VOA vials have zero headspace?<br>* (if contains >5mm headspace) | ✓ | |
| 13. Trip Blank received? | ✓ | |

| | YES | NO |
|---|---|---|
| 14. pH check performed by: MW | | |
| 15. Metals bottle(s) pH <2? | ✓ | |
| 16. Nutrient bottle(s) pH <2? | ✓ | |
| 17. Cyanide bottle(s) pH >12? | ✓ | |
| 18. Sulfide bottle(s) pH >9? | N/A | |
| 19. TOC bottle(s) pH <2? | | |
| 20. Phenolics bottle(s) pH <2? | | |
| 21. Oil & grease bottle(s) pH <2? (checked by analyst) | | |
| 22. EPH/DRO bottle(s) pH <2? (checked by analyst) | | |
| 23. Volatiles (VOA) pH <2? (checked by analyst) | ✓ | |
| 24. Semivolatiles (525) pH <2? (checked by analyst) | | |
| 25. Other test types | | |
| 26. Client contacted? | | |
| 27. Person contacted | | |
| 28. Date contacted | | |

**NOTES: Samples may be affected when not transported at the temperature recommended by the EPA for the test you've selected. Please contact the lab if you have concerns about the temperature of your samples.**

*** Critical item - if marked "NO" contact lab manager.**

**COMMENTS:** ____________________

# APPENDIX E

# SUMMARY OF LABORATORY DATA

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-1S
## Project No. 9731053

| **Sample Date** | **10/5/1994** | **4/28/1995** | **1/16/1996** | **10/8/1996** | **4/29/1997** | **12/10/1997** | **11/19/1998** | **5/6/1999** | **10/20/1999** | **4/25/2000** | **10/18/2000** | **10/21/2001** | **5/11/2007** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **9.8** | **9.5** | **10.2** | **9.3** | **55.7** | **9.5** | **10.1** | **11** | **10.9** | **11.9** | **10.6** | **10.9** | **10.6** |
| **pH, S.U.** | **8.0** | **7.5** | **7.7** | **7.4** | **7.9** | **6.8** | **7.8** | **7.9** | **7.7** | **7.5** | **8.6** | **9.2** | **7.4** |
| **SC** | **1225** | **1233** | **1190** | **1250** | **1570** | **1150** | **1177** | **877** | **1246** | **890** | **3974** | **540** | **1502** |
|  | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** |
| ***Parameter*** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Chloride as Cl, mg/l | 71 | 110 | 131 | 143 | 137 | 139 | 136 | 130 | 130 | 129 | 51 | 50 | 104 |
| Sulfate as SO4, mg/l | 190 | 361 | 334 | 434 | 412 | 418 | 393 | 352 | 365 | 334 | 125 | 102 | 325 |
| Chemical Oxygen Demand, mg.l | 6 | 27 | 12 | 17 | 45 | 9 | 15 | 7 | 14 | 10 | <5 | 10 | 15 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1040 | 1400 | 1520 | 1680 | 1700 | 1680 | 1730 | 1730 | 1600 | 1420 | 538 | 494 | 1380 |
| pH, S.U. | 7.7 | 7.7 | 7.8 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.8 | 7.6 | 8.6 | 9.1 | 8.8 |
| Antimony as Sb (Dissolved), mg/l | 0.006 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic as As (Dissilved), mg/.l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg./l | 0.04 | <0.02 | <0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | <0.02 | <0.02 | <0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium as Cr (Dissolved), mg/l | 0.003 | <0.002 | <0.002 | <0.002 | <0.002 | 0.004 | 0.003 | 0.004 | 0.004 | 0.012 | <0.001 | <0.001 | 0.002 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | 0.004 | 0.003 | <0.001 | 0.001 | 0.001 | 0.002 | <0.001 | 0.001 | 0.002 | <0.001 | <0.001 | 0.002 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.33 | <0.05 | <0.05 |
| Lead as Pb (Dissolved), mg/l | 0.002 | <0.002 | <0.002 | <0.001 | 0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | 0.009 | <0.005 | <0.005 | <0.005 | <0.005 | 0.018 | 0.020 | 0.014 | 0.039 | <0.005 | <0.005 | 0.01 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0005 | <0.0005 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 | <0.001 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.18 | <0.01 |

N:\TYPING\ENV-FAC\9731053\May 2007 GW rpt\Summary of Lab Data\BT-1S lab data

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-101S
### Project No. 9731053

| **Sample Date** | **1/16/1996** | **10/8/1996** | **12/10/1997** | **11/19/1998** | **5/6/1999** | **10/20/1999** | **4/25/2000** | **10/18/2000** | **4/27/2001** | **5/11/2007** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **10.2** | **9.3** | **9.5** | **10.1** | **11** | **10.9** | **11.9** | **10.6** | **10.9** | **10.6** |
| **pH, S.U.** | **7.7** | **7.4** | **6.8** | **7.8** | **7.9** | **7.7** | **7.5** | **8.6** | **9.2** | **7.4** |
| **SC** | **1190** | **1250** | **1150** | **1177** | **877** | **1246** | **890** | **3974** | **540** | **1502** |
| | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** |
| ***Parameter*** | | | | | | | | | | |
| Chloride as Cl, mg/l | 131 | 138 | 137 | 134 | 140 | 126 | 129 | 61 | 48 | 102 |
| Sulfate as SO4, mg/l | 327 | 431 | 416 | 397 | 360 | 370 | 337 | 142 | 109 | 322 |
| Chemical Oxygen Demand, mg.l | 11 | 18 | 14 | 16 | 7 | 10 | 12 | 7 | <5 | 24 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1510 | 1710 | 1690 | 1730 | 1730 | 1590 | 1410 | 583 | 507 | 1380 |
| pH, S.U. | 7.8 | 7.7 | 7.7 | 7.7 | 7.8 | 7.8 | 7.6 | 8.7 | 9.1 | 7.8 |
| Antimony as Sb (Dissolved), mg/l | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic as As (Dissilved), mg/.l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg./l | <0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | <0.02 | <0.02 | 0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium as Cr (Dissolved), mg/l | <0.002 | <0.002 | 0.006 | 0.003 | 0.004 | 0.005 | 0.017 | <0.001 | 0.002 | 0.002 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | <0.001 | 0.001 | 0.002 | 0.001 | 0.002 | 0.013 | <0.001 | <0.001 | 0.008 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | 0.018 | 0.018 | 0.018 | 0.041 | <0.005 | <0.005 | 0.011 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.001 | <0.0005 | <0.0005 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 | <0.001 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.01 |

n\typing\envir\9731053\Summary of lab data\BT-101S

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-2
## Project No. 9731053

| Sample Date | 10/5/1994 | 4/28/1995 | 1/16/1996 | 10/8/1996 | 4/29/1997 | 12/10/1997 | 11/19/1998 | 5/6/1999 | 10/20/1999 | 4/25/2000 | 10/18/2000 | 4/27/2001 | 5/11/2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **9.7** | **9.9** | **10.0** | **9.4** | **51.4** | **9.5** | **10.3** | **11** | **11** | **12.2** | **10.6** | **11** | **10.6** |
| **pH, S.U.** | **9.1** | **8.3** | **8.7** | **8.1** | **8.2** | **7.6** | **9.0** | **9.0** | **8.8** | **8.5** | **8.6** | **8.8** | **8.0** |
| **SC** | **522** | **466** | **446** | **428** | **559** | **360** | **385** | **293** | **405** | **317** | **397** | **580** | **652** |
|  | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results |
| ***Parameter*** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Chloride as Cl, mg/l | 39 | 32 | 28 | 30 | 28 | 31 | 31 | 26 | 26 | 27 | 24 | 33 | 45 |
| Sulfate as SO4, mg/l | 174 | 161 | 146 | 156 | 164 | 147 | 153 | 140 | 152 | 150 | 142 | 140 | 152 |
| Chemical Oxygen Demand, mg.l | 37 | 13 | 46 | 10 | 10 | 8 | 17 | 6 | 36 | 19 | 14 | <5 | 14 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 566 | 450 | 511 | 533 | 549 | 534 | 535 | 539 | 478 | 459 | 471 | 530 | 606 |
| pH, S.U. | 8.2 | 8.0 | 8.1 | 8.7 | 8.6 | 8.6 | 8.7 | 8.6 | 8.7 | 8.6 | 8.5 | 8.8 | 8.6 |
| Antimony as Sb (Dissolved), mg/l | 0.009 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic as As (Dissilved), mg/.l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg./l | 0.03 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium as Cr (Dissolved), mg/l | <0.002 | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | 0.010 | <0.001 | <0.001 | <0.001 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.018 | <0.001 | 0.003 | <0.001 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | 0.11 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0016 | <0.0005 | <0.0005 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 | <0.001 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | 0.04 | <0.01 |

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# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
# SUMMARY OF LABORATORY DATA - WELL NO. BT-3
## Project No. 9731053

| **Sample Date** | **10/4/1994** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **10.4** | | | | | | | | | | |
| **pH, S.U.** | **7.7** | | | | | | | | | | |
| **SC** | **1252** | | | | | | | | | | |
| | Lab Results | | | | | | | | | | |
| ***Parameter*** | | | | | | | | | | | |
| Chloride as Cl, mg/l | 153 | | | | | | | | | | |
| Sulfate as SO4, mg/l | 267 | | | | | | | | | | |
| Chemical Oxygen Demand, mg.l | 7 | | | | | | | | | | |
| Cyanide as CN (Total), mg/l | <0.005 | | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 1450 | | | | | | | | | | |
| pH, S.U. | 7.5 | | | | | | | | | | |
| Antimony as Sb (Dissolved), mg/l | 0.006 | | | | | | | | | | |
| Arsenic as As (Dissilved), mg/.l | <0.005 | | | | | | | | | | |
| Barium as Ba (Dissolved), mg./l | 0.05 | | | | | | | | | | |
| Beryllium as Be (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | | | | | | | | | | |
| Chromium as Cr (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Cobalt as Co (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Copper as Cu (Dissolved), mg/l | <0.001 | | | | | | | | | | |
| Iron as Fe (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Lead as Pb (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Nickel as Ni (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Selenium as Se (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Silver as Ag (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Thallium as Tl (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Vanadium as V (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Zinc as Zn (Dissolved), mg/l | <0.02 | | | | | | | | | | |

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# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-4
### Project No. 9731053

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample Date** | **10/5/1994** | | | | | | | | | | |
| **Temperature, °C** | **9.6** | | | | | | | | | | |
| **pH, S.U.** | **7.9** | | | | | | | | | | |
| **SC** | **928** | | | | | | | | | | |
| | **Lab Results** | | | | | | | | | | |
| ***Parameter*** | | | | | | | | | | | |
| Chloride as Cl, mg/l | 71 | | | | | | | | | | |
| Sulfate as SO4, mg/l | 190 | | | | | | | | | | |
| Chemical Oxygen Demand, mg.l | 6 | | | | | | | | | | |
| Cyanide as CN (Total), mg/l | <0.005 | | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 1040 | | | | | | | | | | |
| pH, S.U. | 7.7 | | | | | | | | | | |
| Antimony as Sb (Dissolved), mg/l | 0.006 | | | | | | | | | | |
| Arsenic as As (Dissilved), mg/.l | <0.005 | | | | | | | | | | |
| Barium as Ba (Dissolved), mg./l | 0.04 | | | | | | | | | | |
| Beryllium as Be (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | | | | | | | | | | |
| Chromium as Cr (Dissolved), mg/l | 0.003 | | | | | | | | | | |
| Cobalt as Co (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Copper as Cu (Dissolved), mg/l | 0.002 | | | | | | | | | | |
| Iron as Fe (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Lead as Pb (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Nickel as Ni (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Selenium as Se (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Silver as Ag (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Thallium as Tl (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Vanadium as V (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Zinc as Zn (Dissolved), mg/l | <0.02 | | | | | | | | | | |

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# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-5
### Project No. 9731053

| **Sample Date** | **10/5/1994** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **9.6** | | | | | | | | | | |
| **pH, S.U.** | **7.9** | | | | | | | | | | |
| **SC** | **928** | | | | | | | | | | |
| | **Lab Results** | | | | | | | | | | |
| ***Parameter*** | | | | | | | | | | | |
| Chloride as Cl, mg/l | 131 | | | | | | | | | | |
| Sulfate as SO4, mg/l | 172 | | | | | | | | | | |
| Chemical Oxygen Demand, mg.l | 6 | | | | | | | | | | |
| Cyanide as CN (Total), mg/l | <0.005 | | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 1050 | | | | | | | | | | |
| pH, S.U. | 7.8 | | | | | | | | | | |
| Antimony as Sb (Dissolved), mg/l | 0.006 | | | | | | | | | | |
| Arsenic as As (Dissilved), mg/.l | <0.005 | | | | | | | | | | |
| Barium as Ba (Dissolved), mg./l | 0.04 | | | | | | | | | | |
| Beryllium as Be (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | | | | | | | | | | |
| Chromium as Cr (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Cobalt as Co (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Copper as Cu (Dissolved), mg/l | 0.003 | | | | | | | | | | |
| Iron as Fe (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Lead as Pb (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Nickel as Ni (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Selenium as Se (Dissolved), mg/l | <0.005 | | | | | | | | | | |
| Silver as Ag (Dissolved), mg/l | <0.0002 | | | | | | | | | | |
| Thallium as Tl (Dissolved), mg/l | <0.002 | | | | | | | | | | |
| Vanadium as V (Dissolved), mg/l | <0.05 | | | | | | | | | | |
| Zinc as Zn (Dissolved), mg/l | <0.02 | | | | | | | | | | |

# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-6
### Project No. 9731053

| **Sample Date** | **10/4/1994** | **4/28/1995** | **1/16/1996** | **10/8/1996** | **4/29/1997** | **12/10/1997** | **11/19/1998** | **5/6/1999** | **10/20/1999** | **4/25/2000** | **10/18/2000** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature, °C** | **11.2** | **9.3** | **10.1** | **9.9** | **59** | | **9.9** | | **11.3** | **11.9** | **10.3** |
| **pH, S.U.** | **9.0** | **8.2** | **8.5** | **7.9** | **8.7** | | **9.2** | | **8.2** | **7.3** | **7.6** |
| **SC** | **950** | **746** | **568** | **612** | **628** | | **403** | | **435** | **342** | **406** |
| | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** | **Lab Results** |
| ***Parameter*** | | | | | | | | | | | |
| Chloride as Cl, mg/l | 153 | 74 | 63 | 74 | 58 | 64 | 56 | 53 | 51 | 56 | 57 |
| Sulfate as SO4, mg/l | 267 | 258 | 174 | 306 | 137 | 117 | 108 | 93 | 96 | 98 | 114 |
| Chemical Oxygen Demand, mg.l | 7 | 3 | 43 | 24 | 204 | 18 | 9 | <5 | 30 | 21 | 40 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1460 | 789 | 586 | 914 | 599 | 621 | 568 | 556 | 502 | 472 | 548 |
| pH, S.U. | 7.5 | 7.7 | 8.2 | 8.6 | 8.6 | 8.2 | 8.5 | 8.6 | 8.5 | 8.6 | 8,5 |
| Antimony as Sb (Dissolved), mg/l | 0.008 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | 0.005 | <0.003 |
| Arsenic as As (Dissilved), mg/.l | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.005 |
| Barium as Ba (Dissolved), mg./l | 0.06 | 0.02 | <0.02 | 0.04 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium as Cr (Dissolved), mg/l | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | 0.003 | <0.001 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.003 | 0.004 | <0.001 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | 0.08 | <0.05 | 0.09 | <0.05 | <0.05 | <0.05 | 0.05 | <0.05 | <0.05 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.011 | <0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0024 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.06 | <0.02 |

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# BIG TIMBER LANDFILL
# BIG TIMBER, MONTANA
## SUMMARY OF LABORATORY DATA - WELL NO. BT-7
### Project No. 9731053

| Sample Date | 1/16/1999 | 10/8/1996 | 4/29/1997 | 12/10/1997 | 11/19/1998 | 5/6/1999 | 10/20/1999 | 4/25/2000 | 10/18/2000 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature, °C | 10 | 10.9 | 54.2 | 9 | 10.3 | 11.6 | 11.5 | 12.6 | 11.1 | | |
| pH, S.U. | 7.2 | 7.4 | 7.4 | | 7.8 | 7.8 | 7.7 | 7.5 | 7.6 | | |
| SC | 1053 | 948 | 121 | 875 | 886 | 693 | 941 | 755 | 941 | | |
| | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | | |
| *Parameter* | | | | | | | | | | | |
| Chloride as Cl, mg/l | 175 | 170 | 177 | 170 | 155 | 160 | 150 | 172 | 169 | | |
| Sulfate as SO4, mg/l | 218 | 237 | 226 | 219 | 226 | 220 | 227 | 231 | 225 | | |
| Chemical Oxygen Demand, mg.l | 20 | 29 | 57 | 21 | 24 | 24 | 21 | 10 | 12 | | |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | | |
| Electrical Conductivity, umhos/cm | 1340 | 1250 | 1300 | 1260 | 1290 | 1320 | 1240 | 1170 | 1220 | | |
| pH, S.U. | 7.3 | 7.6 | 7.7 | 7.7 | 7.7 | 7.8 | 7.8 | 7.6 | 7.7 | | |
| Antimony as Sb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | | |
| Arsenic as As (Dissilved), mg/.l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | | |
| Barium as Ba (Dissolved), mg./l | 0.07 | 0.05 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | <0.02 | <0.02 | | |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | | |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | | |
| Chromium as Cr (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | 0.002 | <0.001 | <0.001 | <0.001 | 0.005 | <0.001 | | |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | | |
| Copper as Cu (Dissolved), mg/l | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.036 | <0.001 | | |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | | |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.001 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | | |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | | |
| Nickel as Ni (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.012 | <0.005 | | |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0033 | <0.0005 | | |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | | |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | | |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | |

# APPENDIX F

# LABORATORY QUALITY CONTROL SUMMARY

## TABLE F-1
## Quality Control Summary
## Volatile Organic Compounds
## Big Timber Landfill
## May, 2007

| Date | 5/14/07 | 5/18/07 | - - - |
|---|---|---|---|
| Calibration | Met method criteria | Met method criteria | - - - |
| Method Blank | All compounds less than reporting limit | All compounds less than reporting limit | - - - |
| Lab Control Sample | LCS compounds within acceptance limits at 97 - 109% | LCS compounds within acceptance limits at 86-90% | - - - |
| Matrix spike/Matrix spike dup. | MS/MSD of non-project sample acceptable ,<br>MS 101-112% / MSD 101-114%<br>RPD = 0-3% | MS/MSD of BT-101 within limits except 1 compound [1]<br>MS 86-122% / MSD 86-96%<br>RPD = 4-35% [1] | - - - |
| Surrogate Recovery | Surrogate recoveries within acceptance limits | Surrogate recoveries within acceptance limits | - - - |

Notes: MS/MSD=Matrix Spike/Matrix Spike Duplicate; LCS=Laboratory Control Sample; RPD=Relative Percent Difference

[1] The recovery of 1,1-dichloroethene in the MS was above the 57-119% control limits at 122% and the RPD between the MS and MSD was above the 20% limit at 35%. The MSD recovery was acceptable at 86%. The recovery and RPD of the other analytes in the MS/MSD was acceptable. 1,1-Dichloroethene was not detected in the sample, therefore the sample concentration was not affected by the high system bias and the results are reported without qualification.

## TABLE F-2
## Quality Control Summary
## Inorganics/Metals
## Big Timber Landfill
## May, 2007

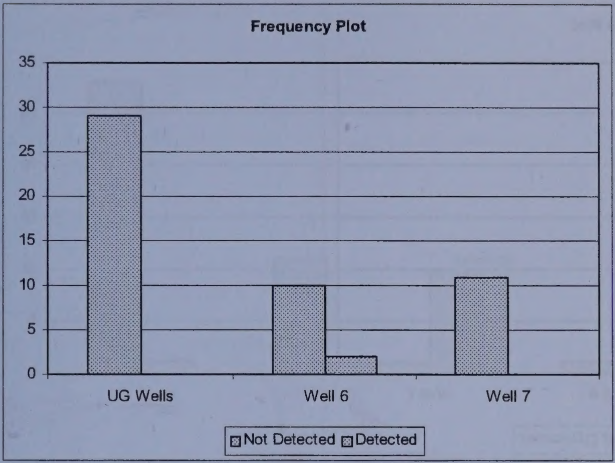
| Analyte | Date of Analysis | CCVs (percent) Limits 90-110% | Blank | LFB (percent) | Accuracy MS/MSD (percent) | Precision RPD (percent) |
|---|---|---|---|---|---|---|
| Chloride (9056) | 6/01/07<br>6/01/07 | 100, 102, 100<br>98, 104, 102 | <1 mg/l<br><1 mg/l | 105<br>99 | 106 / 110 [3]<br>107 / 110 [1] | 3 [2]<br>3 [2] |
| Sulfate (9056) | 5/30/07<br>6/01/07 | 96, 96<br>96, 96, 96 | <5 mg/l<br><5 mg/l | 101<br>98 | 92 / 92 [1]<br>106 / 108 [3] | 0 [2]<br>3 [2] |
| COD (410.2) | 5/14/07 | NA | <5 mg/l | 89 | 98 / 100 [1] | 2 [2] |
| Cyanide (4500CNE) | 5/23/07 | 100, 100, 99 | <0.005 mg/l | 102 | 67 / 69 [1] | 4 [2] |
| EC (9050A) | 5/24/07 | 100, 96, 96 | <10 umhos/cm | 99 | NA | 2 [4] |
| Nitrate + Nitrite (353.2) | 6/05/07 | 100, 97, 97, 97, 97 | <0.01 mg/l | 100 | 94 / 94 [1] | 0 [2] |
| pH (9040B) | 5/11/07 | 101, 100 | NA | 100 | NA | 0 [3] |
| Antimony (6020) | 6/07/07 | 101, 102, 99 | <0.003 mg/l | 107 | 110 / 103 [1] | 6 [2] |
| Arsenic (6020) | 6/07/07 | 98, 98, 99 | <0.005 mg/l | 91 | 107 / 101 [1] | 6 [2] |
| Barium (6010B) | 5/31/07 | 101, 102, 100 | <0.02 mg/l | 105 | 98 / 98 [1] | 0 [2] |
| Beryllium (6020) | 6/07/07 | 102, 99, 101 | <0.001 mg/l | 102 | 99 / 93 [1] | 6 [2] |
| Cadmium (6020) | 6/07/07 | 100, 99, 100 | <0.0001 mg/l | 105 | 107 / 102 [1] | 4 [2] |
| Chromium (6020) | 6/07/07 | 94, 97, 94 | <0.001 mg/l | 103 | 102 / 96 [1] | 6 [2] |
| Cobalt (6020) | 6/07/07 | 95, 92, 98 | <0.002 mg/l | 99 | 100 / 95 [1] | 5 [2] |
| Copper (6020) | 6/07/07 | 96, 94, 97 | <0.001 mg/l | 101 | 110 / 97 [1] | 12 [2] |
| Iron (6010B) | 5/31/07 | 102, 103, 103 | <0.05 mg/l | 102 | 101 / 100 [1] | 1 [2] |
| Lead (6020) | 6/07/07 | 104, 100, 103 | <0.003 mg/l | 112 | 111 / 107 [1] | 3 [2] |
| Mercury (7470A) | 6/06/07 | 104, 107, 109 | <0.0002 mg/l | 107 | 110 / 112 [1] | 2 [2] |
| Nickel (6020) | 6/07/07 | 93, 90, 96 | <0.02 mg/l | 97 | 97 / 93 [1] | 5 [2] |
| Selenium (6020) | 6/07/07 | 98, 97, 101 | <0.005 mg/l | 94 | 100 / 94 [1] | 6 [2] |
| Silver (6020) | 6/13/07 | 108, 108 | 0.0010 B mg/l | 106 | 104 / 104 [1] | 0 [2] |
| Thallium (6020) | 6/07/07 | 105, 101, 105 | <0.001 mg/l | 111 | 111 / 107 [1] | 4 [2] |
| Vanadium (6010B) | 5/31/07 | 101, 102, 100 | <0.05 mg/l | 100 | 99 / 98 [1] | 1 [2] |
| Zinc (6010B) | 5/31/07 | 103, 105, 104 | <0.01 mg/l | 103 | 104 / 102 [1] | 1 [2] |

Notes: CCVs = Continuing Calibration Verification; LFB = Laboratory Fortified Blank; MS/MSD = Matrix Spike/Matrix Spike Duplicates; RPD = Relative percent difference;
NA = Not Applicable; na = not analyzed; mg/l = milligrams per liter
* The value is outside the quality control limit
B – The analyte was detected in the method blank
[1] Quality control analysis performed on sample BT-2
[2] RPD calculated based on the mg/l concentrations of the MS/MSD
[3] Quality control analysis performed on a non-project sample
[4] Duplicate analysis performed on a non-project sample

# APPENDIX G

# STATISTICAL EVALUATION WORKSHEETS

**Arsenic, Upgradient Wells vs BT-6 and BT-7**



| Variable | Descriptive Statistics (PS_AS.sta) Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| As UG | 29 | 2.500000 | 2.500000 | 2.500000 | 2.500000 | 0.000000 |
| As 6 | 12 | 3.083333 | 2.500000 | 2.500000 | 6.000000 | 1.362373 |
| As 7 | 11 | 2.500000 | 2.500000 | 2.500000 | 2.500000 | 0.000000 |

***Poisson Prediciton Limit***

**Upgradient Wells vs. BT 6**

*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **72.5** |
| Downgradient wells n = | 12 |
| Downgradient wells Sum of Counts = | **37** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.4137931 |
| | |
| **Upper prediction limit =** | **47.3372132** |

**Upgradient Wells vs. BT 7**

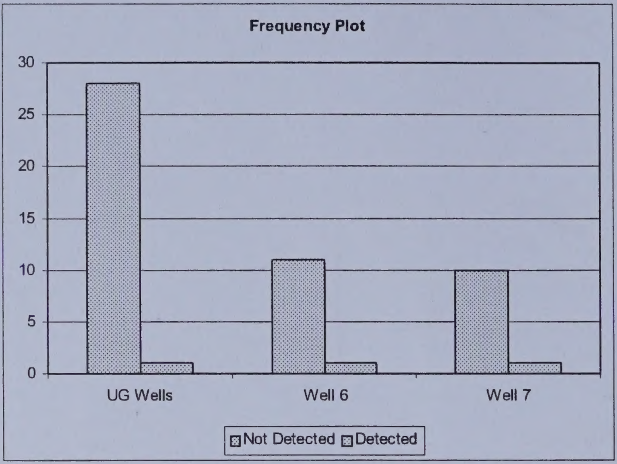
*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **72.5** |
| Downgradient wells n = | 11 |
| Downgradient wells Sum of Counts = | **27.5** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.37931034 |
| **Upper prediction limit =** | **43.8562612** |

If upper prediction limit is greater than the downgradient wells sum of counts, the downgradient wells do not have a significantly greater chance of being contaminated than background.

Poisson Prediction Limit Method for Processing Non-Detect Data as presented in *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance* (Office of Solid Waste, U.S.E.P.A., 1992)

**Silver, Upgradient Wells vs BT-6 and BT-7**



| Variable | Descriptive Statistics (PS_AG.sta) | | | | | |
|---|---|---|---|---|---|---|
| | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Ag UG | 29 | 0.187931 | 0.100000 | 0.100000 | 1.600000 | 0.279239 |
| Ag 6 | 12 | 0.291667 | 0.100000 | 0.100000 | 2.400000 | 0.663953 |
| Ag 7 | 11 | 0.431818 | 0.100000 | 0.100000 | 3.300000 | 0.953749 |

***Poisson Prediciton Limit***

**Upgradient Wells vs. BT 6**

*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **5.45** |
| Downgradient wells n = | 12 |
| Downgradient wells Sum of Counts = | **3.5** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.4137931 |
| | |
| **Upper prediction limit =** | **8.08084202** |

**Upgradient Wells vs. BT 7**

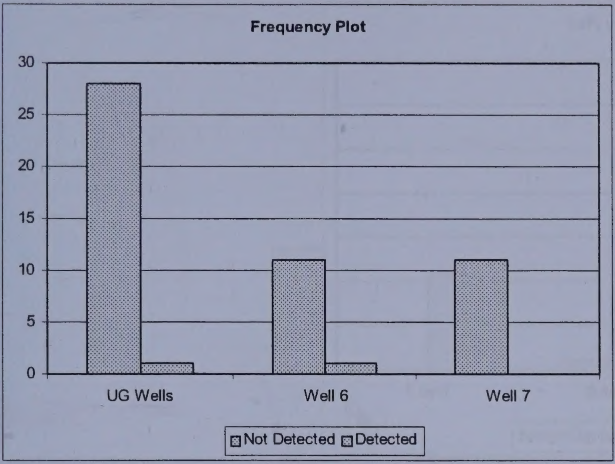
*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **5.45** |
| Downgradient wells n = | 11 |
| Downgradient wells Sum of Counts = | **4.75** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.37931034 |
| **Upper prediction limit =** | **7.5302309** |

If upper prediction limit is greater than the downgradient wells sum of counts, the downgradient wells do not have a significantly greater chance of being contaminated than background.

Poisson Prediction Limit Method for Processing Non-Detect Data as presented in *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance* (Office of Solid Waste, U.S.E.P.A., 1992)

**Cadmium, Upgradient Wells vs BT-6 and BT-7**



| Variable | Descriptive Statistics (PS_CD.sta)<br>Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| Cd UG | 29 | 0.160345 | 0.250000 | 0.050000 | 0.300000 | 0.102102 |
| Cd 6 | 12 | 0.162500 | 0.225000 | 0.050000 | 0.250000 | 0.100284 |
| Cd 7 | 11 | 0.122727 | 0.050000 | 0.050000 | 0.250000 | 0.100905 |

***Poisson Prediciton Limit***

**Upgradient Wells vs. BT 6**

*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **4.65** |
| Downgradient wells n = | 12 |
| Downgradient wells Sum of Counts = | **1.95** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.4137931 |
| **Upper prediction limit =** | **7.4282201** |

**Upgradient Wells vs. BT 7**

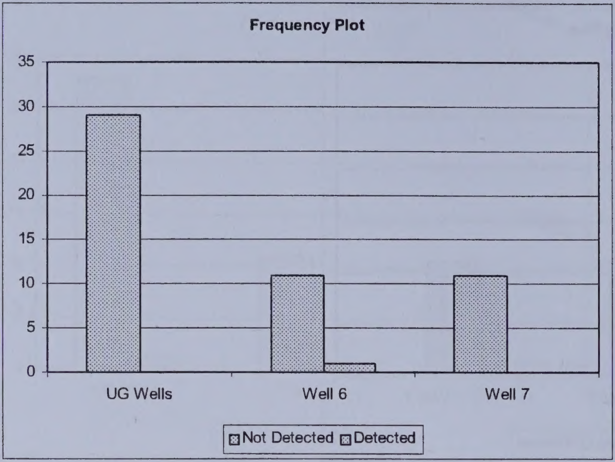
*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **4.65** |
| Downgradient wells n = | 11 |
| Downgradient wells Sum of Counts = | **1.35** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.37931034 |
| **Upper prediction limit =** | **6.92191767** |

If upper prediction limit is greater than the downgradient wells sum of counts, the downgradient wells do not have a significantly greater chance of being contaminated than background.

Poisson Prediction Limit Method for Processing Non-Detect Data as presented in *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance* (Office of Solid Waste, U.S.E.P.A., 1992)

**Cobalt, Upgradient Wells vs BT-6 and BT-7**



| Variable | Descriptive Statistics (PS_CO.sta) | | | | | |
|---|---|---|---|---|---|---|
| | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Co UG | 29 | 1.775862 | 2.500000 | 1.000000 | 2.500000 | 0.762821 |
| Co 6 | 12 | 2.041667 | 1.750000 | 1.000000 | 6.000000 | 1.453184 |
| Co 7 | 11 | 1.545455 | 1.000000 | 1.000000 | 2.500000 | 0.756787 |

***Poisson Prediciton Limit***

**Upgradient Wells vs. BT 6**

*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **51.5** |
| Downgradient wells n = | 12 |
| Downgradient wells Sum of Counts = | **24.5** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.4137931 |
| | |
| **Upper prediction limit =** | **36.1364034** |

**Upgradient Wells vs. BT 7**

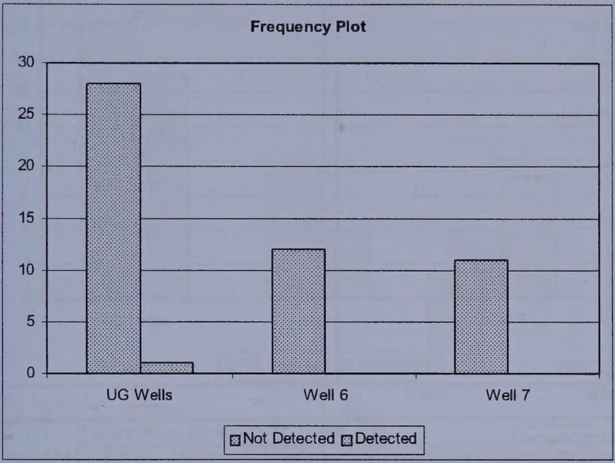
*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **51.5** |
| Downgradient wells n = | 11 |
| Downgradient wells Sum of Counts = | **17** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.37931034 |
| | |
| **Upper prediction limit =** | **33.5154805** |

If upper prediction limit is greater than the downgradient wells sum of counts, the downgradient wells do not have a significantly greater chance of being contaminated than background.

Poisson Prediction Limit Method for Processing Non-Detect Data as presented in *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance* (Office of Solid Waste, U.S.E.P.A., 1992)

## Nickel, Upgradient Wells vs BT-6 and BT-7



| Variable | Descriptive Statistics (PS_NI.sta)<br>Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| Ni UG | 29 | 13.27586 | 10.00000 | 10.00000 | 30.00000 | 6.584053 |
| Ni 6 | 12 | 11.25000 | 10.00000 | 10.00000 | 25.00000 | 4.330127 |
| Ni 7 | 11 | 10.00000 | 10.00000 | 10.00000 | 10.00000 | 0.000000 |

***Poisson Prediciton Limit***

**Upgradient Wells vs. BT 6**

*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **385** |
| Downgradient wells n = | 12 |
| Downgradient wells Sum of Counts = | **135** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.4137931 |
| | |
| **Upper prediction limit =** | **197.53508** |

**Upgradient Wells vs. BT 7**

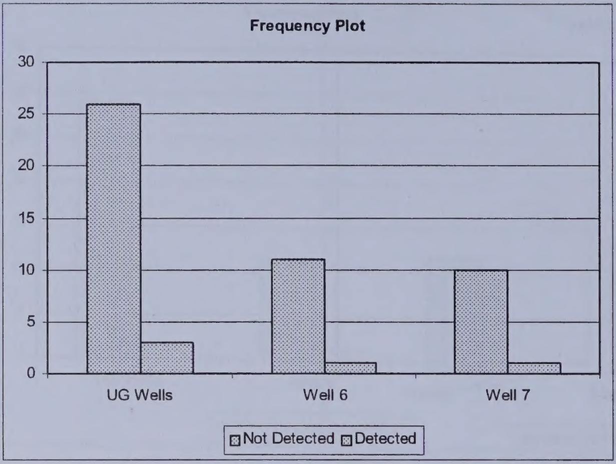
*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **385** |
| Downgradient wells n = | 11 |
| Downgradient wells Sum of Counts = | **110** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.37931034 |
| **Upper prediction limit =** | **182.145215** |

If upper prediction limit is greater than the downgradient wells sum of counts, the downgradient wells do not have a significantly greater chance of being contaminated than background.

Poisson Prediction Limit Method for Processing Non-Detect Data as presented in *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance* (Office of Solid Waste, U.S.E.P.A., 1992)

**Zinc, Upgradient Wells vs BT-6 and BT-7**



| Variable | Descriptive Statistics (PS_ZN.sta) | | | | | |
|---|---|---|---|---|---|---|
| | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Zn UG | 29 | 0.025517 | 0.020000 | 0.010000 | 0.180000 | 0.030070 |
| Zn 6 | 12 | 0.023333 | 0.020000 | 0.020000 | 0.060000 | 0.011547 |
| Zn 7 | 11 | 0.020909 | 0.020000 | 0.010000 | 0.040000 | 0.007006 |

***Poisson Prediciton Limit***

**Upgradient Wells vs. BT 6**

*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **0.74** |
| Downgradient wells n = | 12 |
| Downgradient wells Sum of Counts = | **0.28** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.4137931 |
| | |
| **Upper prediction limit =** | **3.60896044** |

**Upgradient Wells vs. BT 7**

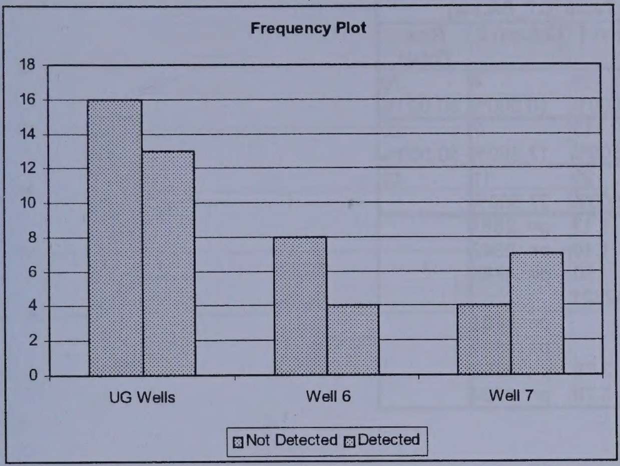
*Input:*

| | |
|---|---|
| Background well n = | 29 |
| Background well Sum of Counts = | **0.74** |
| Downgradient wells n = | 11 |
| Downgradient wells Sum of Counts = | **0.23** |
| *Calculated:* | |
| Students t for one-sided 99% = | 2.46202135 |
| c = n downgradient/n background | 0.37931034 |
| **Upper prediction limit =** | **3.34559216** |

If upper prediction limit is greater than the downgradient wells sum of counts, the downgradient wells do not have a significantly greater chance of being contaminated than background.

Poisson Prediction Limit Method for Processing Non-Detect Data as presented in *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance* (Office of Solid Waste, U.S.E.P.A., 1992)

**Barium, Upgradient Wells vs. BT-6 and BT-7**



| Variable | Descriptive Statistics (CT_BA.sta)<br>Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| Ba UG | 29 | 0.027241 | 0.020000 | 0.020000 | 0.080000 | 0.012789 |
| Ba 6 | 12 | 0.025000 | 0.020000 | 0.020000 | 0.060000 | 0.012432 |
| Ba 7 | 11 | 0.032727 | 0.030000 | 0.020000 | 0.070000 | 0.015551 |

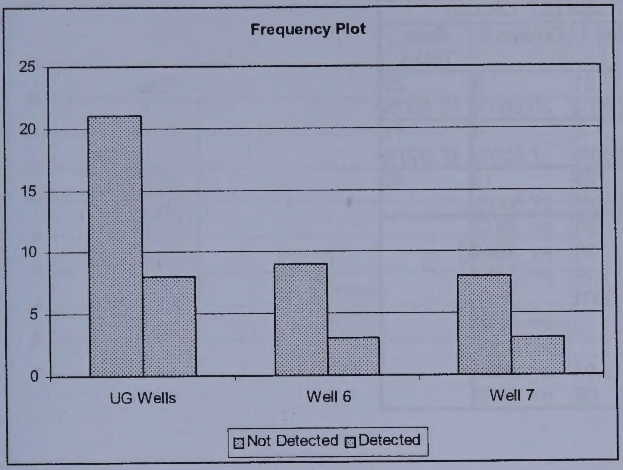
**Upgradient Wells vs. BT-6:**

| | 2 x 2 Table (CT_BA.sta)<br>Column 1 | Column 2 | Row Totals |
|---|---|---|---|
| Frequencies, row 1 | 16 | 8 | 24 |
| Percent of total | 39.024% | 19.512% | 58.537% |
| Frequencies, row 2 | 13 | 4 | 17 |
| Percent of total | 31.707% | 9.756% | 41.463% |
| Column totals | 29 | 12 | 41 |
| Percent of total | 70.732% | 29.268% | |
| Chi-square (df=1) | .46 | p= .4967 | |
| V-square (df=1) | .45 | p= .5020 | |
| Yates corrected Chi-square | .11 | p= .7404 | |
| Phi-square | .01127 | | |
| Fisher exact p, one-tailed | | p= .3737 | |
| two-tailed | | p= .7289 | |
| McNemar Chi-square (A/D) | 6.05 | p= .0139 | |
| Chi-square (B/C) | .76 | p= .3827 | |

**Upgradient Wells vs. BT-7:**

| | 2 x 2 Table (CT_BA.sta) | | |
|---|---|---|---|
| | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 16 | 4 | 20 |
| Percent of total | 40.000% | 10.000% | 50.000% |
| Frequencies, row 2 | 13 | 7 | 20 |
| Percent of total | 32.500% | 17.500% | 50.000% |
| Column totals | 29 | 11 | 40 |
| Percent of total | 72.500% | 27.500% | |
| Chi-square (df=1) | 1.13 | p= .2881 | |
| V-square (df=1) | 1.10 | p= .2942 | |
| Yates corrected Chi-square | .50 | p= .4788 | |
| Phi-square | .02821 | | |
| Fisher exact p, one-tailed | | p= .2401 | |
| two-tailed | | p= .4801 | |
| McNemar Chi-square (A/D) | 2.78 | p= .0953 | |
| Chi-square (B/C) | 3.76 | p= .0524 | |

**Chromium, Upgradient Wells vs. BT-6 and BT-7**

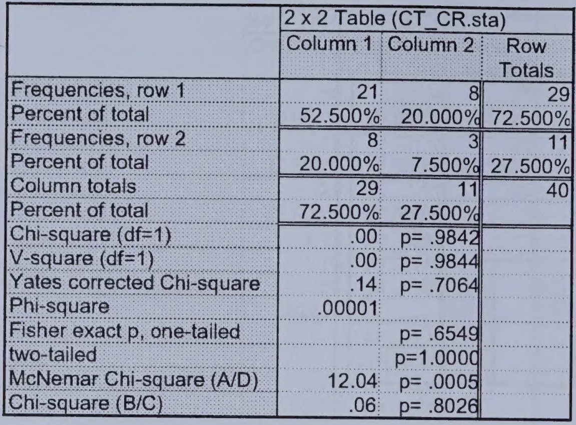


| Variable | Descriptive Statistics (CT_CR.sta)<br>Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| Cr UG | 29 | 0.002621 | 0.002000 | 0.001000 | 0.012000 | 0.002499 |
| Cr 6 | 12 | 0.002250 | 0.002000 | 0.001000 | 0.008000 | 0.001913 |
| Cr 7 | 11 | 0.001909 | 0.002000 | 0.001000 | 0.005000 | 0.001221 |

**Upgradient Wells vs. BT-6:**

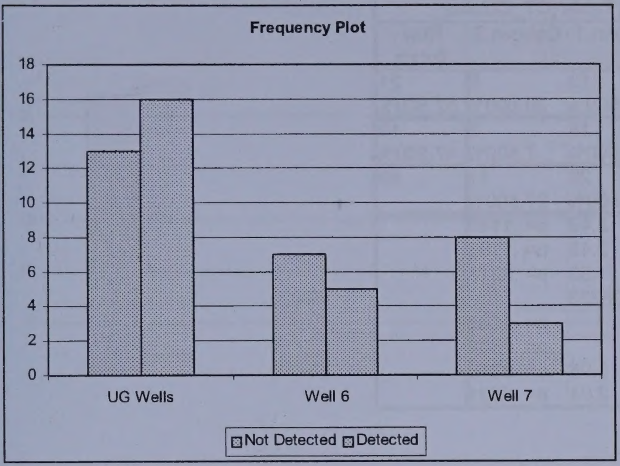
|  | 2 x 2 Table (CT_CR.sta)<br>Column 1 | Column 2 | Row Totals |
|---|---|---|---|
| Frequencies, row 1 | 21 | 9 | 30 |
| Percent of total | 51.220% | 21.951% | 73.171% |
| Frequencies, row 2 | 8 | 3 | 11 |
| Percent of total | 19.512% | 7.317% | 26.829% |
| Column totals | 29 | 12 | 41 |
| Percent of total | 70.732% | 29.268% |  |
| Chi-square (df=1) | .03 | p= .8650 |  |
| V-square (df=1) | .03 | p= .8666 |  |
| Yates corrected Chi-square | .05 | p= .8280 |  |
| Phi-square | .00071 |  |  |
| Fisher exact p, one-tailed |  | p= .5951 |  |
| two-tailed |  | p=1.0000 |  |
| McNemar Chi-square (A/D) | 12.04 | p= .0005 |  |
| Chi-square (B/C) | 0.00 | p=1.0000 |  |

**Upgradient Wells vs. BT-7:**



| | 2 x 2 Table (CT_CR.sta) | | |
|---|---|---|---|
| | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 21 | 8 | 29 |
| Percent of total | 52.500% | 20.000% | 72.500% |
| Frequencies, row 2 | 8 | 3 | 11 |
| Percent of total | 20.000% | 7.500% | 27.500% |
| Column totals | 29 | 11 | 40 |
| Percent of total | 72.500% | 27.500% | |
| Chi-square (df=1) | .00 | p= .9842 | |
| V-square (df=1) | .00 | p= .9844 | |
| Yates corrected Chi-square | .14 | p= .7064 | |
| Phi-square | .00001 | | |
| Fisher exact p, one-tailed | | p= .6549 | |
| two-tailed | | p=1.0000 | |
| McNemar Chi-square (A/D) | 12.04 | p= .0005 | |
| Chi-square (B/C) | .06 | p= .8026 | |

**Copper, Upgradient Wells vs. BT-6 and BT-7**

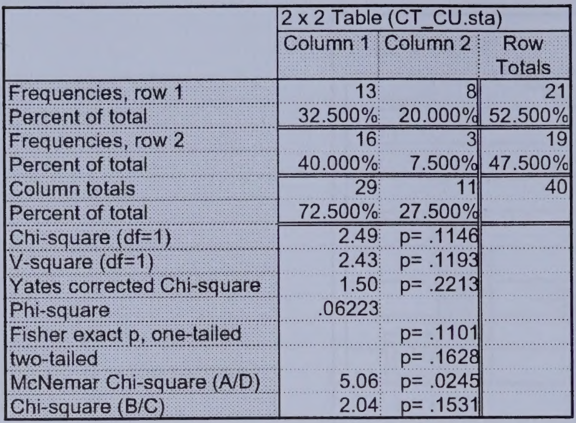


| | Descriptive Statistics (CT_CU.sta) | | | | | |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| Cu UG | 29 | 0.002448 | 0.001000 | 0.001000 | 0.018000 | 0.003355 |
| Cu 6 | 12 | 0.001583 | 0.001000 | 0.001000 | 0.004000 | 0.000996 |
| Cu 7 | 11 | 0.004455 | 0.001000 | 0.001000 | 0.036000 | 0.010482 |

**Upgradient Wells vs. BT-6:**

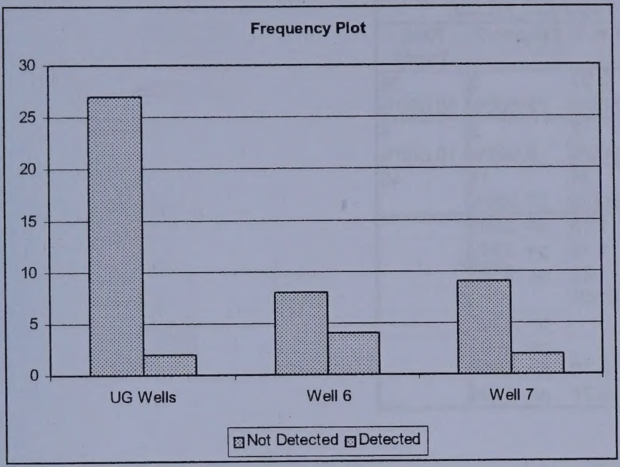
| | 2 x 2 Table (CT_CU.sta) | | |
|---|---|---|---|
| | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 13 | 7 | 20 |
| Percent of total | 31.707% | 17.073% | 48.780% |
| Frequencies, row 2 | 16 | 5 | 21 |
| Percent of total | 39.024% | 12.195% | 51.220% |
| Column totals | 29 | 12 | 41 |
| Percent of total | 70.732% | 29.268% | |
| Chi-square (df=1) | .62 | p= .4312 | |
| V-square (df=1) | .60 | p= .4369 | |
| Yates corrected Chi-square | .20 | p= .6572 | |
| Phi-square | .01511 | | |
| Fisher exact p, one-tailed | | p= .3288 | |
| two-tailed | | p= .5055 | |
| McNemar Chi-square (A/D) | 2.72 | p= .0990 | |
| Chi-square (B/C) | 2.78 | p= .0953 | |

**Upgradient Wells vs. BT-7:**



|  | 2 x 2 Table (CT_CU.sta) |  |  |
|---|---|---|---|
|  | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 13 | 8 | 21 |
| Percent of total | 32.500% | 20.000% | 52.500% |
| Frequencies, row 2 | 16 | 3 | 19 |
| Percent of total | 40.000% | 7.500% | 47.500% |
| Column totals | 29 | 11 | 40 |
| Percent of total | 72.500% | 27.500% |  |
| Chi-square (df=1) | 2.49 | p= .1146 |  |
| V-square (df=1) | 2.43 | p= .1193 |  |
| Yates corrected Chi-square | 1.50 | p= .2213 |  |
| Phi-square | .06223 |  |  |
| Fisher exact p, one-tailed |  | p= .1101 |  |
| two-tailed |  | p= .1628 |  |
| McNemar Chi-square (A/D) | 5.06 | p= .0245 |  |
| Chi-square (B/C) | 2.04 | p= .1531 |  |

**Iron, Upgradient Wells vs. BT-6 and BT-7**

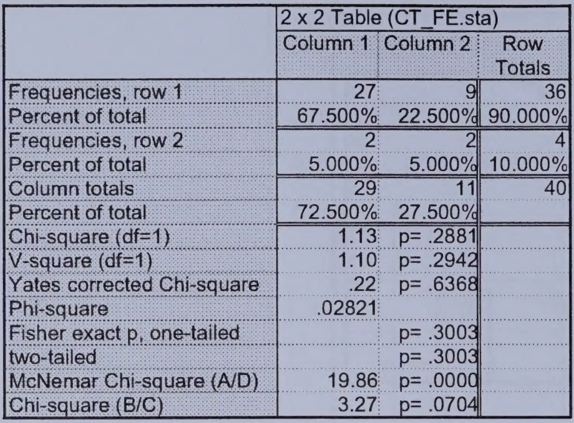


| Variable | Descriptive Statistics (CT_FE.sta)<br>Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| Fe UG | 29 | 0.061724 | 0.050000 | 0.050000 | 0.330000 | 0.052785 |
| Fe 6 | 12 | 0.123333 | 0.050000 | 0.050000 | 0.860000 | 0.232392 |
| Fe 7 | 11 | 0.050909 | 0.050000 | 0.050000 | 0.060000 | 0.003015 |

**Upgradient Wells vs. BT-6:**

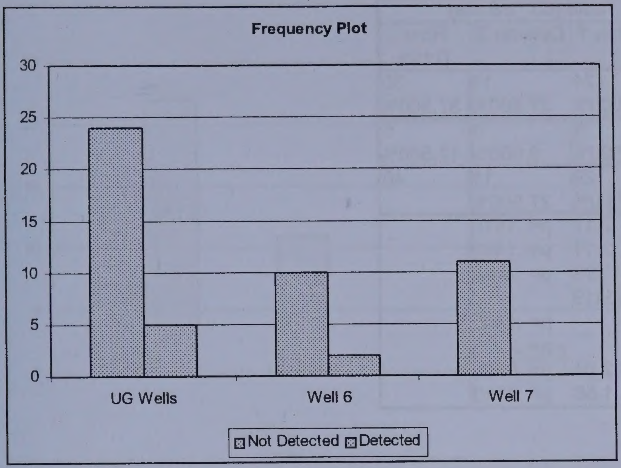
|  | 2 x 2 Table (CT_FE.sta)<br>Column 1 | Column 2 | Row Totals |
|---|---|---|---|
| Frequencies, row 1 | 27 | 8 | 35 |
| Percent of total | 65.854% | 19.512% | 85.366% |
| Frequencies, row 2 | 2 | 4 | 6 |
| Percent of total | 4.878% | 9.756% | 14.634% |
| Column totals | 29 | 12 | 41 |
| Percent of total | 70.732% | 29.268% |  |
| Chi-square (df=1) | 4.75 | p= .0293 |  |
| V-square (df=1) | 4.63 | p= .0314 |  |
| Yates corrected Chi-square | 2.87 | p= .0904 |  |
| Phi-square | .11582 |  |  |
| Fisher exact p, one-tailed |  | p= .0500 |  |
| two-tailed |  | p= .0500 |  |
| McNemar Chi-square (A/D) | 15.61 | p= .0001 |  |
| Chi-square (B/C) | 2.50 | p= .1139 |  |

**Upgradient Wells vs. BT-7:**



|  | 2 x 2 Table (CT_FE.sta) |  |  |
|---|---|---|---|
|  | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 27 | 9 | 36 |
| Percent of total | 67.500% | 22.500% | 90.000% |
| Frequencies, row 2 | 2 | 2 | 4 |
| Percent of total | 5.000% | 5.000% | 10.000% |
| Column totals | 29 | 11 | 40 |
| Percent of total | 72.500% | 27.500% |  |
| Chi-square (df=1) | 1.13 | p= .2881 |  |
| V-square (df=1) | 1.10 | p= .2942 |  |
| Yates corrected Chi-square | .22 | p= .6368 |  |
| Phi-square | .02821 |  |  |
| Fisher exact p, one-tailed |  | p= .3003 |  |
| two-tailed |  | p= .3003 |  |
| McNemar Chi-square (A/D) | 19.86 | p= .0000 |  |
| Chi-square (B/C) | 3.27 | p= .0704 |  |

**Antimony, Upgradient Wells vs. BT-6 and BT-7**



| Variable | Descriptive Statistics (CT_SB.sta)<br>Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| Sb UG | 29 | 0.003414 | 0.00300C | 0.00200C | 0.00900C | 0.001803 |
| Sb 6 | 12 | 0.00325C | 0.00300C | 0.00200C | 0.00800C | 0.001712 |
| Sb 7 | 11 | 0.002727 | 0.00300C | 0.00200C | 0.00300C | 0.000467 |

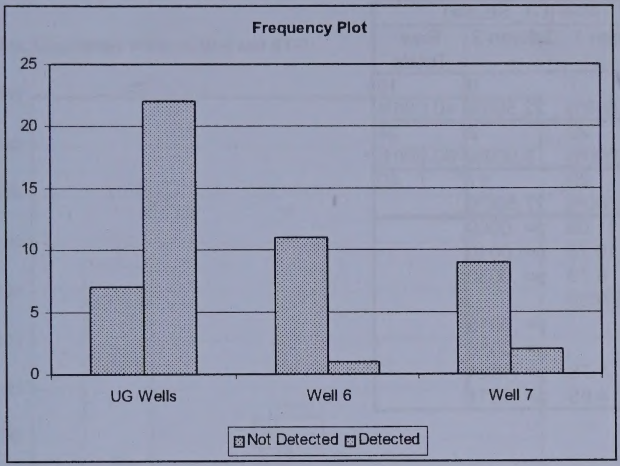
**Upgradient Wells vs. BT-6:**

| | 2 x 2 Table (CT_SB.sta)<br>Column 1 | Column 2 | Row Totals |
|---|---|---|---|
| Frequencies, row 1 | 24 | 10 | 34 |
| Percent of total | 58.537% | 24.390% | 82.927% |
| Frequencies, row 2 | 5 | 2 | 7 |
| Percent of total | 12.195% | 4.878% | 17.073% |
| Column totals | 29 | 12 | 41 |
| Percent of total | 70.732% | 29.268% | |
| Chi-square (df=1) | .00 | p= .9645 | |
| V-square (df=1) | .00 | p= .9649 | |
| Yates corrected Chi-square | .17 | p= .6806 | |
| Phi-square | .00005 | | |
| Fisher exact p, one-tailed | | p= .6716 | |
| two-tailed | | p=1.0000 | |
| McNemar Chi-square (A/D) | 16.96 | p= .0000 | |
| Chi-square (B/C) | 1.07 | p= .3017 | |

**Upgradient Wells vs. BT-7:**

|  | 2 x 2 Table (CT_SB.sta) |  |  |
|---|---|---|---|
|  | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 24 | 11 | 35 |
| Percent of total | 60.000% | 27.500% | 87.500% |
| Frequencies, row 2 | 5 | 0 | 5 |
| Percent of total | 12.500% | 0.000% | 12.500% |
| Column totals | 29 | 11 | 40 |
| Percent of total | 72.500% | 27.500% |  |
| Chi-square (df=1) | 2.17 | p= .1410 |  |
| V-square (df=1) | 2.11 | p= .1460 |  |
| Yates corrected Chi-square | .88 | p= .3488 |  |
| Phi-square | .05419 |  |  |
| Fisher exact p, one-tailed |  | p= .1805 |  |
| two-tailed |  | p= .2975 |  |
| McNemar Chi-square (A/D) | 22.04 | p= .0000 |  |
| Chi-square (B/C) | 1.56 | p= .2113 |  |

**Selenium, Upgradient Wells vs. BT-6 and BT-7**

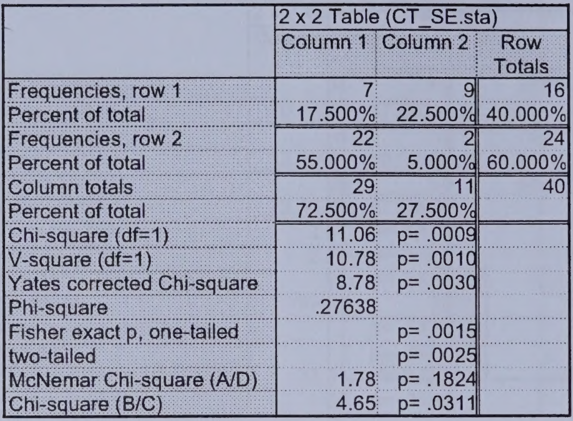


| Variable | Descriptive Statistics (CT_SE.sta)<br>Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| Se UG | 29 | 0.007793 | 0.005000 | 0.005000 | 0.039000 | 0.007188 |
| Se 6 | 12 | 0.005500 | 0.005000 | 0.005000 | 0.011000 | 0.001732 |
| Se 7 | 11 | 0.005818 | 0.005000 | 0.005000 | 0.012000 | 0.002136 |

**Upgradient Wells vs. BT-6:**

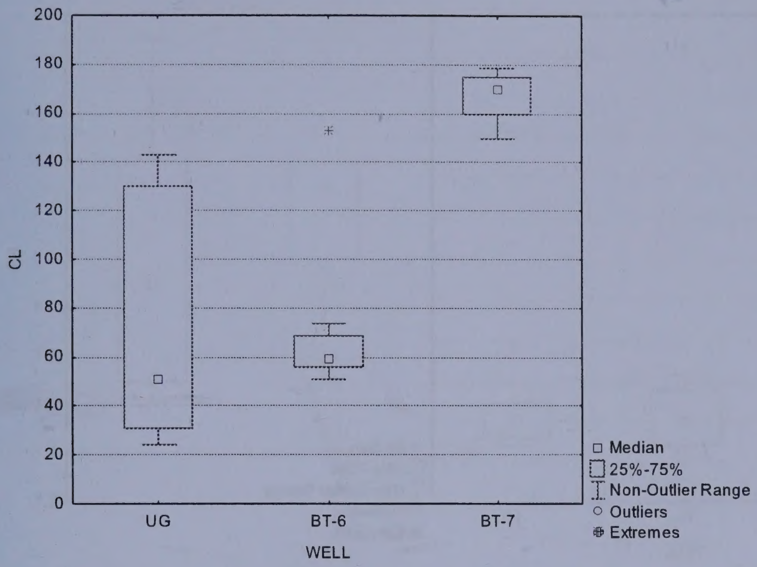
|  | 2 x 2 Table (CT_SE.sta)<br>Column 1 | Column 2 | Row Totals |
|---|---|---|---|
| Frequencies, row 1 | 7 | 11 | 18 |
| Percent of total | 17.073% | 26.829% | 43.902% |
| Frequencies, row 2 | 22 | 1 | 23 |
| Percent of total | 53.659% | 2.439% | 56.098% |
| Column totals | 29 | 12 | 41 |
| Percent of total | 70.732% | 29.268% |  |
| Chi-square (df=1) | 15.72 | p= .0001 |  |
| V-square (df=1) | 15.33 | p= .0001 |  |
| Yates corrected Chi-square | 13.09 | p= .0003 |  |
| Phi-square | .38332 |  |  |
| Fisher exact p, one-tailed |  | p= .0001 |  |
| two-tailed |  | p= .0001 |  |
| McNemar Chi-square (A/D) | 3.13 | p= .0771 |  |
| Chi-square (B/C) | 3.03 | p= .0817 |  |

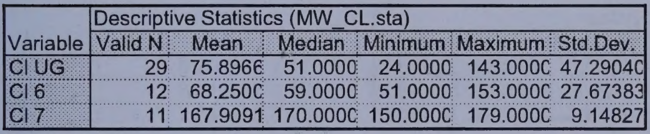
**Upgradient Wells vs. BT-7:**



| | 2 x 2 Table (CT_SE.sta) | | |
|---|---|---|---|
| | Column 1 | Column 2 | Row Totals |
| Frequencies, row 1 | 7 | 9 | 16 |
| Percent of total | 17.500% | 22.500% | 40.000% |
| Frequencies, row 2 | 22 | 2 | 24 |
| Percent of total | 55.000% | 5.000% | 60.000% |
| Column totals | 29 | 11 | 40 |
| Percent of total | 72.500% | 27.500% | |
| Chi-square (df=1) | 11.06 | p= .0009 | |
| V-square (df=1) | 10.78 | p= .0010 | |
| Yates corrected Chi-square | 8.78 | p= .0030 | |
| Phi-square | .27638 | | |
| Fisher exact p, one-tailed | | p= .0015 | |
| two-tailed | | p= .0025 | |
| McNemar Chi-square (A/D) | 1.78 | p= .1824 | |
| Chi-square (B/C) | 4.65 | p= .0311 | |

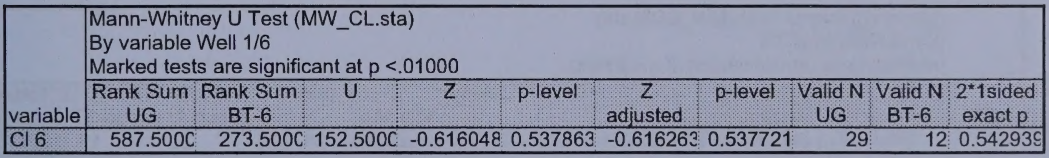
**Chloride, Upgradient Wells vs. Bt-6 and BT-7**





| Variable | Descriptive Statistics (MW_CL.sta)<br>Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
|---|---|---|---|---|---|---|
| Cl UG | 29 | 75.8966 | 51.0000 | 24.0000 | 143.000C | 47.2904C |
| Cl 6 | 12 | 68.250C | 59.0000 | 51.0000 | 153.000C | 27.67383 |
| Cl 7 | 11 | 167.9091 | 170.000C | 150.000C | 179.000C | 9.14827 |

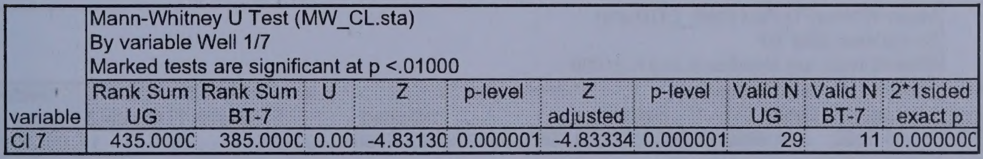
**Chloride, Upgradient Wells vs BT-6**



Mann-Whitney U Test (MW_CL.sta)
By variable Well 1/6
Marked tests are significant at p <.01000

| variable | Rank Sum UG | Rank Sum BT-6 | U | Z | p-level | Z adjusted | p-level | Valid N UG | Valid N BT-6 | 2*1sided exact p |
|---|---|---|---|---|---|---|---|---|---|---|
| Cl 6 | 587.500C | 273.500C | 152.500C | -0.616048 | 0.537863 | -0.61626З | 0.537721 | 29 | 12 | 0.54293 |

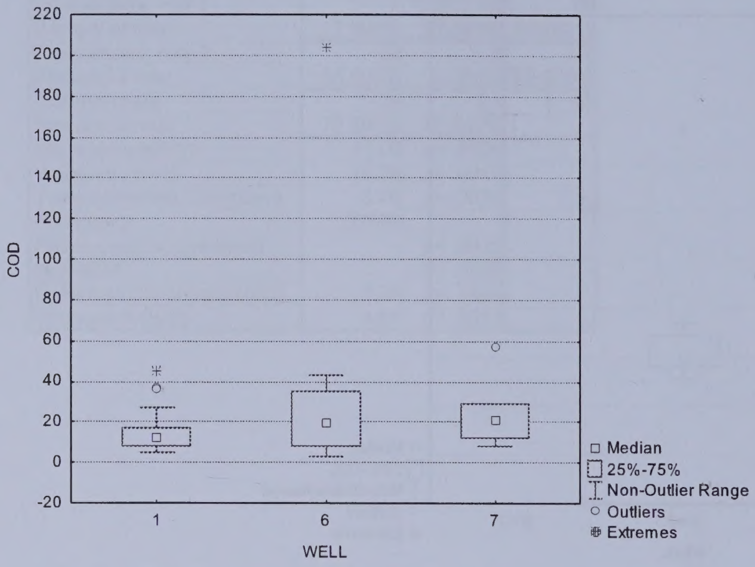
**Chloride, Upgradient Wells vs BT-7**



Mann-Whitney U Test (MW_CL.sta)
By variable Well 1/7
Marked tests are significant at p <.01000

| variable | Rank Sum UG | Rank Sum BT-7 | U | Z | p-level | Z adjusted | p-level | Valid N UG | Valid N BT-7 | 2*1sided exact p |
|---|---|---|---|---|---|---|---|---|---|---|
| Cl 7 | 435.000C | 385.000C | 0.00 | -4.83130 | 0.000001 | -4.83334 | 0.000001 | 29 | 11 | 0.00000C |

**Chemical Oxygen Demand, Upgradient Wells vs. Bt-6 and BT-7**



| Variable | Descriptive Statistics (MW_COD.sta) | | | | | |
|---|---|---|---|---|---|---|
| | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| COD UG | 29 | 15.37241 | 12.00000 | 4.900000 | 46.0000 | 11.66649 |
| COD 6 | 12 | 34.99167 | 19.50000 | 3.000000 | 204.0000 | 54.79881 |
| COD 7 | 11 | 23.18182 | 21.00000 | 8.000000 | 57.0000 | 13.27267 |

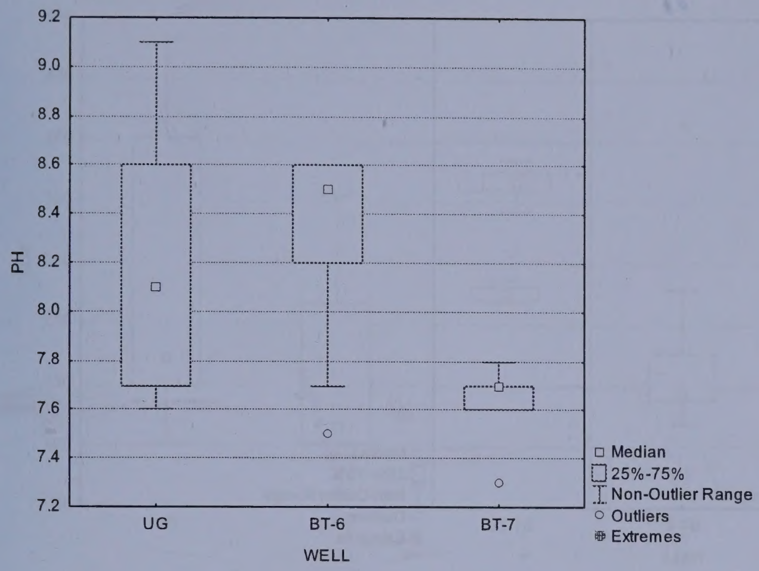
**Chemical Oxygen Demand, Upgradient Wells vs BT-6**

| variable | Mann-Whitney U Test (MW_COD.sta)<br>By variable Well 1/6<br>Marked tests are significant at p <.01000 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Rank Sum Group 1 | Rank Sum Group 2 | U | Z | p-level | Z adjusted | p-level | Valid N Group 1 | Valid N Group 2 | 2*1sided exact p |
| COD 6 | 566.0000 | 295.0000 | 131.0000 | -1.23210 | 0.217914 | -1.23355 | 0.217372 | 29 | 12 | 0.226735 |

**Chemical Oxygen Demand, Upgradient Wells vs BT-7**

| variable | Mann-Whitney U Test (MW_COD.sta)<br>By variable Well 1/7<br>Marked tests are significant at p <.01000 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rank Sum Group 1 | Rank Sum Group 2 | U | Z | p-level | Z adjusted | p-level | Valid N Group 1 | Valid N Group 2 | 2*1sided exact p |
| COD 7 | 520.5000 | 299.5000 | 85.50000 | -2.24148 | 0.024996 | -2.24559 | 0.024731 | 29 | 11 | 0.023393 |

**pH, Upgradient Wells vs. Bt-6 and BT-7**



| | Descriptive Statistics (MW_pH.sta) | | | | | |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| pH UG | 29 | 8.206897 | 8.10000 | 7.60000 | 9.10000 | 0.468227 |
| pH 6 | 12 | 8.316667 | 8.50000 | 7.50000 | 8.60000 | 0.368864 |
| pH 7 | 11 | 7.64545 | 7.70000 | 7.30000 | 7.80000 | 0.136848 |

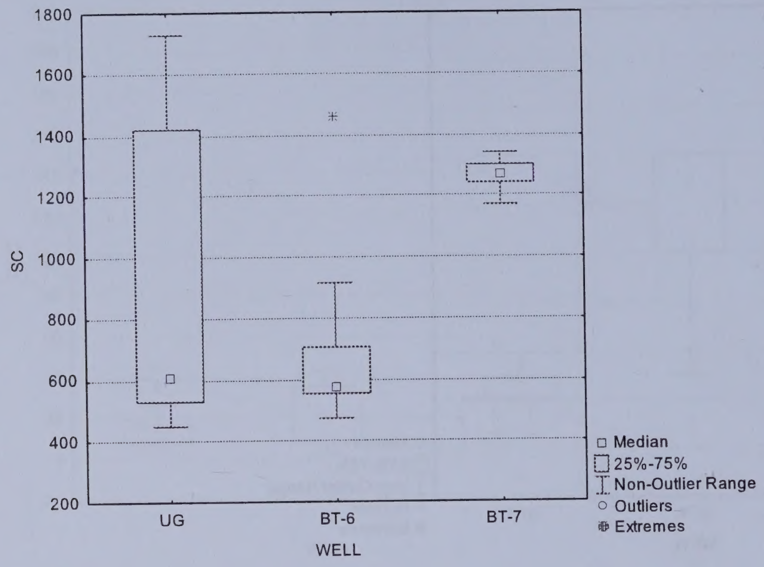
**pH, Upgradient Wells vs BT-6**

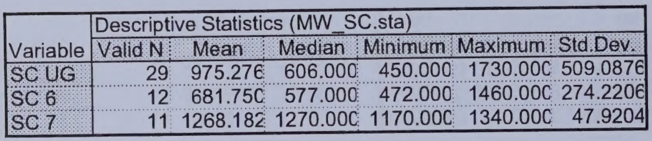
| | Mann-Whitney U Test (MW_pH.sta)<br>By variable Well 1/6<br>Marked tests are significant at p <.01000 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| variable | Rank Sum Group 1 | Rank Sum Group 2 | U | Z | p-level | Z adjusted | p-level | Valid N Group 1 | Valid N Group 2 | 2*1sided exact p |
| pH 6 | 600.0000 | 261.0000 | 165.0000 | -0.257881 | 0.79649 | -0.26053 | 0.79444 | 29 | 12 | 0.81019 |

**pH, Upgradient Wells vs BT-7**

| | Mann-Whitney U Test (MW_pH.sta)<br>By variable Well 1/7<br>Marked tests are significant at p <.01000 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| variable | Rank Sum Group 1 | Rank Sum Group 2 | U | Z | p-level | Z adjusted | p-level | Valid N Group 1 | Valid N Group 2 | 2*1sided exact p |
| pH 7 | 713.5000 | 106.5000 | 40.5000 | 3.604544 | 0.00031 | 3.654597 | 0.00025 | 29 | 11 | 0.00011 |

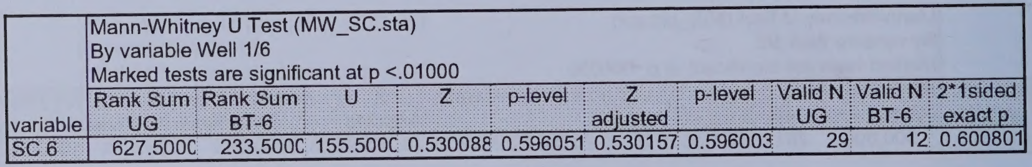
**Specific Conductance, Upgradient Wells vs BT-6 and BT-7**





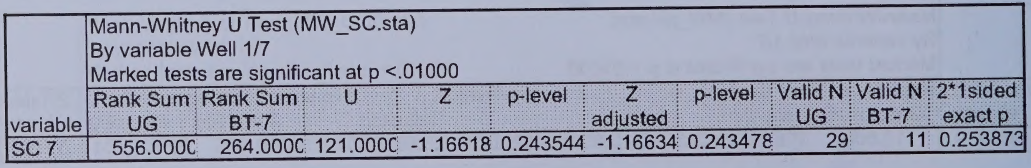
| Variable | Descriptive Statistics (MW_SC.sta) | | | | | |
|---|---|---|---|---|---|---|
| | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| SC UG | 29 | 975.276 | 606.000 | 450.000 | 1730.00C | 509.0876 |
| SC 6 | 12 | 681.75C | 577.000 | 472.000 | 1460.00C | 274.2206 |
| SC 7 | 11 | 1268.182 | 1270.00C | 1170.00C | 1340.00C | 47.9204 |

**SC, Upgradient Wells vs BT-6**



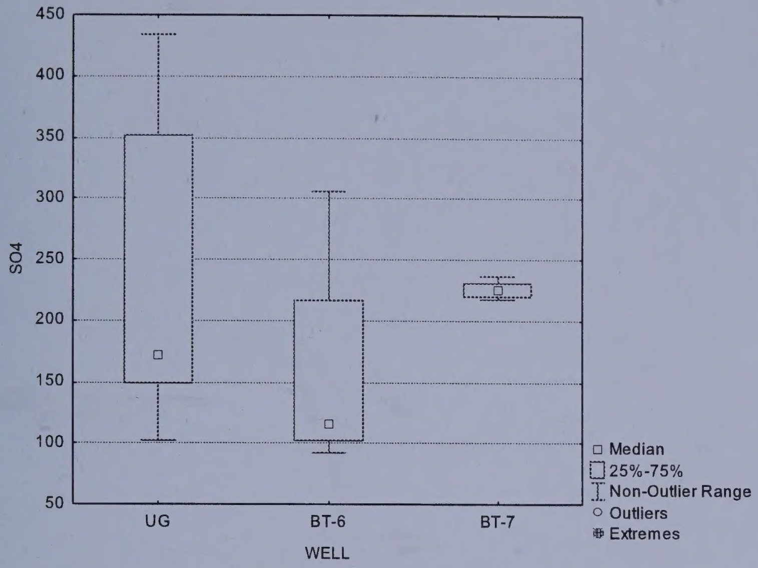
| variable | Mann-Whitney U Test (MW_SC.sta)<br>By variable Well 1/6<br>Marked tests are significant at p <.01000 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rank Sum UG | Rank Sum BT-6 | U | Z | p-level | Z adjusted | p-level | Valid N UG | Valid N BT-6 | 2*1sided exact p |
| SC 6 | 627.500C | 233.500C | 155.500C | 0.530088 | 0.596051 | 0.530157 | 0.596003 | 29 | 12 | 0.600801 |

**SC, Upgradient Wells vs BT-7**



| variable | Mann-Whitney U Test (MW_SC.sta)<br>By variable Well 1/7<br>Marked tests are significant at p <.01000 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rank Sum UG | Rank Sum BT-7 | U | Z | p-level | Z adjusted | p-level | Valid N UG | Valid N BT-7 | 2*1sided exact p |
| SC 7 | 556.000C | 264.000C | 121.000C | -1.16618 | 0.243544 | -1.16634 | 0.243478 | 29 | 11 | 0.253873 |

**Sulfate, Upgradient Wells vs BT-6 and BT-7**



|  | Descriptive Statistics (MW_SO4.sta) |  |  |  |  |  |
|---|---|---|---|---|---|---|
| Variable | Valid N | Mean | Median | Minimum | Maximum | Std.Dev. |
| SO4 UG | 29 | 241.2414 | 172.0000 | 102.0000 | 434.0000 | 113.0523 |
| SO4 6 | 12 | 156.5000 | 115.5000 | 93.0000 | 306.0000 | 76.5726 |
| SO4 7 | 11 | 226.2727 | 226.0000 | 218.0000 | 237.0000 | 5.8837 |

**Sulfate, Upgradient Wells vs BT-6**

|  | Mann-Whitney U Test (MW_SO4.sta)<br>By variable Well 1/6<br>Marked tests are significant at p <.01000 |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
| variable | Rank Sum UG | Rank Sum BT-6 | U | Z | p-level | Z adjusted | p-level | Valid N UG | Valid N BT-6 | 2*1sided exact p |
| SO4 6 | 710.5000 | 150.5000 | 72.50000 | 2.908321 | 0.003634 | 2.909082 | 0.003625 | 29 | 12 | 0.002725 |

**Sulfate, Upgradient Wells vs BT-6**

|  | Mann-Whitney U Test (MW_SO4.sta)<br>By variable Well 1/7<br>Marked tests are significant at p <.01000 |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
| variable | Rank Sum UG | Rank Sum BT-7 | U | Z | p-level | Z adjusted | p-level | Valid N UG | Valid N BT-7 | 2*1sided exact p |
| SO4 7 | 567.0000 | 253.0000 | 132.0000 | -0.832983 | 0.404855 | -0.833178 | 0.404745 | 29 | 11 | 0.419068 |

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# BIG TIMBER, MONTANA

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# BIG TIMBER, MONTANA

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COMMUNITY SERVICES BUREAU

August 9, 2001

Mr. Willy Littell
City of Big Timber
P.O. Box 416
Big Timber, MT 59011

**SUBJECT:** **April 2001 Groundwater Monitoring Results**
**Big Timber Sanitary Landfill, Big Timber, Montana**
**Maxim Project No. 9731053.100**

Dear Mr. Littell:

The attached report presents groundwater monitoring data collected by Maxim Technologies, Inc. (Maxim) on April 27, 2001 at the Big Timber Sanitary Landfill near Big Timber, Montana. The work was conducted in accordance with our proposal dated July 5, 1994 and the terms and conditions of the Professional Services Agreement between Maxim and the City of Big Timber dated September 30, 1994.

Concentrations of all parameters measured during this monitoring event were below regulatory enforcement standards (ARM 17.50.710(5). These results were similar to previous monitoring events. Statistical analysis of regulated inorganic constituents detected in groundwater samples determined that the chloride concentration in well BT-7 was statistically significantly greater than chloride concentrations in background wells. However, a statistical evaluation of the chloride concentration in well BT-7 indicates the chloride concentration is not increasing over time and is likely naturally occurring. All other parameters detected at the landfill site are statistically considered to be within the range of background concentrations.

If you have any questions regarding this report or any aspect of the project, please do not hesitate to call us. We appreciate the opportunity to serve your environmental consulting needs.

Respectfully Submitted,

**Maxim Technologies, Inc.®**

Jeffrey R. Rice
Environmental Group Manager

Brian H. McHugh, P.G.
Office Manager

JRR(PJT)rr

Enclosures

n:\envir\9731053\btlf\Big Timber LF April 01 GW.doc

cc: Erl Tufte, Morrison Maierle, Inc., Billings, Montana
Pat Potts, MDEQ

# APRIL 2001
# GROUNDWATER MONITORING RESULTS
# BIG TIMBER SANITARY LANDFILL
# BIG TIMBER, MONTANA

Prepared for:

City of Big Timber
P.O. Box 416
Big Timber, Montana 59011

Prepared by:

Maxim Technologies, Inc.
P.O. Box 30615
Billings, Montana 59107

Maxim Project No. 9731053.100

July 2001

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# 1.0 INTRODUCTION

This report presents groundwater monitoring data collected by Maxim Technologies, Inc., (Maxim) at the Big Timber Sanitary Landfill (Figures 1 and 2) on April 27, 2001. Maxim personnel completed groundwater monitoring activities at the landfill in accordance with the Professional Services Agreement between the City of Big Timber and Maxim, dated September 30, 1994 and the Sampling and Analysis Plan dated April 1995 (Maxim Technologies, Inc., 1995).

The Big Timber Sanitary landfill started receiving waste in 1992, stopped accepting waste in April 1997, and has completed implementation of its closure plan. The Administrative Rules of Montana Title 17, Chapter 50, Sub-Chapter 7 (ARM 17.50.7), require semi-annual groundwater monitoring at Class II municipal solid waste landfills. The April 27, 2001 monitoring event was conducted to fulfill post-closure monitoring requirements of these rules. Methods used to complete groundwater monitoring activities and results of this monitoring event are described in Sections 2.0 and 3.0 of this report.

# 2.0 METHODS

Field data collection activities and laboratory analyses were completed in accordance with procedures described in Maxim's Sampling and Analysis Plan (Maxim, 1995). In accordance with correspondence from the Montana Department of Environmental Quality (MDEQ) Waste Management Division dated April 12, 1995, deviations from the Sampling and Analysis Plan included the following:

- Groundwater samples were not collected from monitoring wells BT-1D and BT-3 through BT-5.
- A groundwater sample was collected from monitoring well BT-7.

# 3.0 RESULTS

The following sections present data collected at the Big Timber Sanitary Landfill during this monitoring event. These data are also discussed and compared with data collected during previous monitoring events.

## 3.1 HYDROGEOLOGIC EVALUATION

The former landfill is located on gently sloping rangeland, approximately one-half mile north of the Yellowstone River flood plain. The hydrogeologic setting at this site consists of water bearing sandstone and mudstone interbedded in non-water bearing shale of the Cretaceous Hell Creek Formation. Approximately ten feet of silty clay overlies the Hell Creek bedrock sediments in the northeastern two-thirds of the site.

Geologic cross-sections were constructed using the lithology data provided in the monitoring well logs (Appendix A; Figures 3 and 4). Geologic cross-section A-A' trends southwest to northeast and passes through wells BT-6, BT-1, BT-5, BT-3, and BT-4. Geologic cross-section B-B' trends southwest to northeast and passes through wells BT-7 and BT-2. The geology is the eastern upgradient portion of the site is typically unconsolidated silty clay underlain by shale, mudstone and stringers of sandstone. The upgradient monitoring wells are screened in the sandstone or mudstone geologic units. The geology in downgradient well BT-6 is similar to the geology of the upgradient wells except that sandstone is not present. The unconsolidated silty clay is not present in downgradient well BT-7 and sandstone is present at the surface. Well BT-7 appears to be located in geologic sediments which are different than those sediments in the other monitoring wells.

A summary of all groundwater level data measured at the landfill since September 1989 is contained in Appendix B. A potentiometric surface contour map of groundwater elevations calculated from the data collected during this monitoring event is presented on Figure 5. Based on the groundwater potentiometric surface, groundwater flows in a southwesterly direction under a gradient that varies from approximately 2.5 percent in the central portion of the landfill property to approximately 6.7

percent in the southwestern portion downgradient of the former waste cell and burn pit. The flow direction and gradients are similar to those calculated from previous measurements.

Hydrographs were plotted for monitoring wells BT-1S, BT-4, BT-5, and BT-6 using the water level data collected since October 1994 (Appendix B). These hydrographs indicate that seasonal fluctuations in the shallow water table under the landfill are generally not significant except in the southwest corner of the site where the groundwater elevation in well BT-6 fluctuates over five feet seasonally.

Hydraulic conductivities ranging from 0.31 feet per day (feet/day) to 0.85 feet/day were calculated using data from single well aquifer tests conducted at the site (Chen-Northern, Inc., 1990). The effective porosity of the water-bearing sandstone, siltstone, and mudstone at the site is estimated to be 20 percent (Chen-Northern, Inc., 1990). Based on the measured gradients, the groundwater velocity calculated using Darcy's Law (Freeze and Cherry, 1979) is expected to range from 0.026 to 1.14 feet/day at the site. Groundwater velocity calculations are contained in Appendix C. The transport distance from the former waste cell to downgradient wells BT-6 and BT-7 is approximately 300 feet. Using the range of linear flow velocities, the travel time to reach the downgradient wells (BT-6 and BT-7) would range from approximately three to eight years.

The landfill cell is located between wells BT-2 and BT-7 as shown on Figure 4. This cell was excavated in the unconsolidated silty clay and weathered shale to an approximate depth of 20 feet. As shown in Figure 4, the base of the landfill cell is approximately 10 feet above the April 27, 2001 potentiometric surface. Based on historical groundwater level data collected at the Big Timber Landfill (Appendix B), the April 2001 potentiometric surface represents the near low groundwater elevation. Seasonal groundwater fluctuations at the site are approximately five to six feet. The base of the landfill cell would be approximately four to five feet above the groundwater potentiometric surface during periods of high groundwater elevations.

## 3.2 GROUNDWATER QUALITY

Groundwater samples were collected from monitoring wells BT-1S, BT-2, BT-6, and BT-7 on April 27, 2001. Copies of groundwater sampling logs from this monitoring event are contained in Appendix D. The laboratory results are presented in Table 1. Laboratory analytical results and chain-of-custody forms for groundwater samples collected at the landfill during this sampling event are presented in Appendix E.

### 3.2.1 Inorganic Water Quality

Of the inorganic parameters analyzed, chemical oxygen demand (COD), chloride, electrical conductivity (EC), nitrate, sulfate, zinc, chromium, copper, iron, and cadmium were detected with concentrations above their respective laboratory practical quantitation limits (PQLs) during this monitoring event. Concentrations of these parameters were all below groundwater protection standards as described in ARM 17.50.710(5). Concentrations of inorganic constituents in downgradient wells BT-6 and BT-7 do not appear indicative of any landfill leachate migration.

### 3.2.2 Organic Water Quality

Concentrations of volatile organic compounds (VOCs) were below their respective PQLs in all water samples collected at the landfill during this monitoring event.

## TABLE 1
## GROUNDWATER ANALYTICAL RESULTS
## BIG TIMBER SANITARY LANDFILL
## APRIL 27, 2001

| PARAMETER | UNITS | BT-1S | BT-101[3] | BT-2 | BT-6 | BT-7 |
|---|---|---|---|---|---|---|
| Temperature | °C | 10.9 | 10.9 | 11.0 | 12.9 | 12.0 |
| Electrical Conductivity | µmhos/cm | 494 | 507 | 530 | 566 | 1,270 |
| Chloride | mg/l | 50 | 48 | 33 | 60 | 179 |
| Sulfate | mg/l | 102 | 109 | 140 | 108 | 227 |
| Chemical Oxygen Demand | mg/l | 10 | <5 | <5 | 16 | 8 |
| Cyanide | mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| pH | s.u. | 9.1 | 9.1 | 8.8 | 8.3 | 7.6 |
| Nitrate+Nitrite as N | mg/l | 0.18 | 0.18 | <0.05 | 0.05 | <0.05 |
| Antimony | mg/l | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic | mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium | mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Beryllium | mg/l | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium | mg/l | <0.0001 | <0.0001 | <0.0001 | 0.0002 | <0.0001 |
| Chromium | mg/l | <0.001 | 0.002 | <0.001 | 0.008 | 0.003 |
| Cobalt | mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper | mg/l | <0.001 | <0.001 | 0.003 | 0.002 | 0.003 |
| Iron | mg/l | <0.05 | <0.05 | <0.05 | 0.86 | 0.06 |
| Lead | mg/l | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury | mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel | mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium | mg/l | <0.005 | <0.005 | <0.005 | <0.005 | 0.005 |
| Silver | mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Thallium | mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Vanadium | mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc[2] | mg/l | 0.18 | <0.02 | 0.04 | <0.02 | 0.04 |
| VOCs[1] | µg/l | ND | ND | ND | ND | ND |

[1] VOCs – Volatile organic compounds analyzed by EPA Method 8260, see laboratory report in Appendix E for reporting limits

[2] Zinc concentrations are considered estimated, see Section 4.1

[3] Duplicate of well BT-1S

s.u. = standard units
mg/l = milligrams per liter
ND = not detected at laboratory reporting
µg/l = micrograms per liter
°C = degrees Centigrade
µmhos/cm = micromhos per centimeter

# 4.0 DATA VALIDATION

This section describes the data validation process used to determine the adequacy and quality of laboratory analytical data collected at the Big Timber Sanitary Landfill. The objective of data validation is to identify any unreliable or invalid laboratory measurements and qualify that data for interpretive use. These validations are performed according to guidelines prepared by U.S. Environmental Protection Agency (USEPA; 1994a and 1994b).

## 4.1 FIELD QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

A field duplicate sample (BT-101) was collected during this monitoring event from monitoring well BT-1S. A trip blank was also submitted to the laboratory. This trip blank consisted of deionized water, which was prepared and containerized by laboratory personnel and transported to the landfill prior to laboratory submittal. Laboratory analytical reports for these samples are presented in Appendix E.

The field duplicate sample was analyzed for inorganic parameters and VOCs. The trip blank was analyzed for VOCs only. No VOCs were detected at concentrations above the PQLs in the trip blank.

Analytical results for the original and duplicate samples collected from monitoring well BT-1S were evaluated by calculating the relative percent difference (RPD) between the two samples for those parameters with concentrations greater than five times the PQL. If the RPD for a pair of samples is greater than 20%, the analytical results are considered estimated values. The absolute value difference (AVD) between the two samples was calculated when one or both values for a given parameter were less than five times the PQL. If the AVD for a pair of samples is greater than the PQL, the values are considered estimated. In the event one of the quality assurance and quality control (QA/QC) sample results is less than the PQL, the PQL is used to represent the concentration of the parameter in that sample. These procedures are recommended in USEPA data validation guidelines (USEPA, 1988).

Calculated RPDs for chloride, sulfate, nitrate plus nitrite, electrical conductivity, and pH were less than 20 percent. Therefore, the valued detected for these parameters are considered valid. The AVD for nitrate plus nitrite, and chromium were less than five times the laboratory PQL. Therefore, these concentrations are considered valid.

Zinc was detected in sample BT-1S at a concentration of 0.18 milligrams per liter (mg/l). However, zinc was not detected above the 0.02 mg/l PQL for field duplicate sample BT-101. The calculated AVD for zinc in these samples was 0.16 mg/l, which is greater than five times the PQL. Therefore, the zinc concentrations are considered estimated. All other parameters tested for had concentrations less than the laboratory PQL for both samples BT1S and BT-101.

## 4.2 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Groundwater samples from the Big Timber Sanitary Landfill were received at Northern Analytical Laboratories in Billings, Montana on April 30, 2001. Chain-of-custody documents accompanied the samples from sample collection to receipt at the laboratory. The water sample collected from monitoring well BT-1S was split to obtain matrix spike and matrix spike duplicate samples. A review of laboratory quality assurance/quality control procedures indicates that the reported analytical results are valid.

# 5.0 STATISTICAL QULAITY ASSURANCE/QULAITY CONTROL ANALYSIS

## 5.1 STATISTICAL TEST METHODS

Data in this statistical evaluation have small sample sizes and exhibit non-normal distributions for which non-parametric statistical techniques are appropriate (USEPA, 1988 and 1992). In accordance with EPA guidance (USEPA, 1988 and 1992) and ARM 17.50.708, a comparison of all wells is first performed at the 95 percent confidence level to determine if any significant differences exist among wells. If a statistically significant difference exists, multiple comparison procedures, testing the difference between each downgradient well (BT-6 and BT-7) and upgradient well group (BT-1S, BT-2, BT-3, BT-4 and BT-5) are performed at the 99 percent confidence level. If there is a statistically significant difference, then there is evidence that the downgradient well exceeds background concentrations.

When the percentage of non-detectable values in the data set are less than or equal to 50 percent, the Kruskal-Wallis and Mann-Whitney tests are used as non-parametric methods for the comparison of median concentrations. The Kruskal-Wallis test is used for the comparison of multiple medians and the Mann-Whitney test is used for individual well comparisons. Use of these tests is recommended where data are not normally distributed and these tests tend to be more powerful than parametric tests for detecting differences in small data sets. Sample sizes of four or more observations for each well are recommended (USEPA, 1992).. Comparison of multiple wells is two-sided, testing the alternative that medians are not equal. Individual well comparisons are one-sided, testing the alternative that the concentration in the downgradient well is greater than the background well. In each test, data are ranked prior to median calculation and the tests are performed on the ranks. Resulting p-values are used to test the significance of differences. A p-value less than or equal to 0.05 indicates a statistically significant difference in medians at the 95 percent confidence level (comparisons of multiple well medians). A p-value less than or equal to 0.01 indicates a statistically significant difference in medians at the 99 percent confidence level (individual well comparisons).

If more than 50 percent of the data set is below detection, but more than 10 percent of the observations are quantified, the test of proportions, also known as contingency table analysis, is used as a test of the

proportion of non-detectable values in each well. Use of this technique is recommended by the US EPA (1988 and 1992) and is endorsed by Helsel and Hirsch (1992) as an alternative in heavily censored data. Comparison of multiple wells is two-sided testing the alternative that the proportions of non-detectable values differ. Individual well comparisons are one-sided, testing the alternative that proportion of detectable values in the downgradient well is greater than background. A chi-square statistic is calculated by comparing the observed counts with the expected counts when the null hypothesis is true. This statistic is compared to the 95th (comparison of multiple wells) or 99th (individual well comparisons) quartiles of the chi-square distribution. If the calculated statistic is greater than the tabulated chi-square test statistic, this indicates a statistically significant difference at the 95 or 99 percent confidence level, respectively.

When 90 percent or more of the data are non-detectable values, USEPA (1988 and 1992) and Gibbons (1994) recommend the use of the Poisson prediction interval method to test whether a rare observation represents a significant increase over background levels. For comparison purposes, an upper limit is calculated from background data. To test the upper prediction limit, the sum of the Poisson counts of the independent observations made in the comparison wells are calculated. For multiple well comparisons, the upper limit is calculated at the 95 percent confidence level and the 99 percent confidence level is used for individual well comparisons. If this sum is greater than the upper prediction limit, there is evidence of significant increase over background levels. It should be noted, that since power functions are used in calculating the upper limit, all calculations are performed using units of micrograms per liter.

Analytical data reported for these wells have multiple detection limits (multiple PQLs) for any one parameter over the time period represented by the data. These data have been censored following US EPA guidance (USEPA, 1988 and USEPA, 1992) and using techniques appropriate to the statistical method. For the Kruskal-Wallis and Mann-Whitney tests, an attempt is made to censor non-detectable values at the highest detection limit as recommended by Helsel and Hirsh (1992). In instances where the highest detection limit is extreme or masks a large proportion of the data, the observations associated with the extreme values are discarded and the remaining non-detectable values are censored at the next highest limit. Non-detectable data are then further censored to distinguish between data detected at the practical quantitation limit (PQL) and data between the method detection limit (MDL)

and PQL. Data evaluated by contingency tables are not censored since this is simply a test of proportions (Helsel and Hirsch 1992). For calculating Poisson prediction intervals, non-detectable data are replaced by one half the practical quantitation limit associated with the observation (USEPA, 1992).

## 5.2 STATISTICAL TEST RESULTS

Of those parameters listed in Table 1 of ARM 17.50.708, the following parameters exhibited detectable concentrations at or above the PQL on at least one occasion over the period of record in samples collected from downgradient monitoring wells BT-6 and BT-7: antimony, arsenic, barium, cadmium, chloride, cobalt, COD, chromium, copper, iron, nickel, pH, electrical conductivity, selenium, silver, sulfate, and zinc. For those downgradient wells exhibiting detectable concentrations of these parameters, water quality data over the period of record were statistically evaluated to determine which showed a statistically significant increase when compared to the background well. Data used in the statistical evaluation of these parameters are listed in Appendix F.

Results of statistical analyses are summarized in Table 2 and output from statistical analyses including descriptive statistics, data plots, and test results are presented in Appendix G. Of the sixteen parameters tested, only chloride in well BT-7 exhibited concentrations that were statistically significantly greater than background levels. The null hypothesis, that concentrations were not significantly greater, was accepted for all other parameters. Except for pH, all statistical evaluations were one-sided, testing the alternative hypothesis that concentrations were greater than background.

A statistical analysis was conducted comparing the April 27, 2001 chloride concentration in well BT-7 with historic chloride concentrations in well BT-7 (Appendix G). The Mann-Kendall test for well BT-7 has a P-value less than 0.010 and a slightly negative Tau indicating that the April 27, 2001 chloride concentration is not statistically significantly different from the previous chloride concentrations and the chloride values are decreasing slightly over time. The statistically significant increase in chloride concentration in well BT-7 relative to chloride concentrations in upgradient monitoring wells may be due to the different geologic sediments in well BT-7 and naturally occurring higher concentrations of chloride.

## TABLE 2
## SUMMARY OF STATISTICAL COMPARISONS TO BACKGROUND
## BIG TIMBER SANITARY LANDFILL
## APRIL 27, 2001

| Parameter | Statistical Tests[1] | Sample Sizes[2] | Kruskal-Wallis P-Value[3] | Mann-Whitney Wells / P-Values[3] | Contingency Table Wells / P-Values[4] | Poisson Prediction Limit[5] | Statistically Significant Exceedance |
|---|---|---|---|---|---|---|---|
| Arsenic | PPI | 27/12/10 | - | - | - | 72.99 | None |
| Silver | PPI | 27/12/10 | - | - | - | 9.98 | None |
| Barium | CT | 27/12/10 | - | - | All / 0.229 | - | None |
| Cadmium | PPI | 27/12/10 | - | - | - | 9.47 | None |
| Chloride | KW / MW | 27/12/10 | 0.000 | BT-6 / 0.271<br>BT-7 / 0.000 | - | - | BT-7 |
| Cobalt | PPI | 27/12/10 | - | - | - | 56.16 | None |
| COD | KW | 27/12/10 | 0.120 | - | - | - | None |
| Chromium | CT | 27/12/10 | - | - | All / 0.960 | - | None |
| Copper | CT | 27/12/10 | - | - | All/0.150 | - | None |
| Iron | CT | 27/12/10 | - | - | All / 0.093 | - | None |
| pH | KW / MW | 27/12/10 | 0.002 | BT-6 / 0.306<br>BT-7 / 0.010 | - | - | None |
| Antimony | CT | 27/12/10 | - | - | All / 0.653 | - | None |
| Specific Conductance | KW | 27/12/10 | 0.075 | - | - | - | None |
| Selenium | CT | 27/12/10 | - | - | (6) | - | None |
| Sulfate | KW | 27/12/10 | 0.014 | (6)<br>BT-7 / 0.201 | - | - | None |
| Zinc | CT | 27/12/10 | - | - | - | 0.97 | None |

**Notes:**

[1] KW - Kruskal-Wallis Rank Sum; MW - Mann-Whitney Rank Sum; CT - Contingency Table; PPI - Poisson Prediction Interval; If more than one test is indicated, the first test indicates the test used for comparison of multiple wells and the second test indicates the test used for individual well comparisons.

[2] Parameter sample sizes for each well included in statistical evaluation: Upgradient group of BT-1S, BT-2, BT-3, BT-4, and BT-5.

[3] The p-value is the probability of obtaining the calculated test statistic given that the null hypothesis is true.

[4] The p-value is the probability of obtaining the calculated test statistic given that the null hypothesis is true; it is determined by comparing the chi-square statistic to the chi-square distribution with 2 degrees of freedom (multiple comparisons) or 1 degree of freedom (individual comparisons).

[5] The Poisson prediction limits report the upper prediction limit based on background observations.

[6] The comparison of one or more downgradient wells to upgradient well group was not meaningful since the median value or proportion of detectable values to non-detectable values for the upgradient well group was greater than (or less than in the case of pH) the downgradient well(s).

## 6.0 CONCLUSIONS AND RECOMMENDATIONS

This report includes statistical analysis and hydrological review of historical data at the Big Timber Landfill for the purposes of establishing recommendations for future work at the facility. The results of this report identify the following:

- The Big Timber Sanitary Landfill received waste for approximately five years from 1992 and 1997.
- The organics analyses have not detected any volatile organic compounds during the history of monitoring at the site.
- The concentrations of inorganic constituents in downgradient wells BT-6 and BT-7 do not appear indicative of any landfill leachate migration.
- Statistical analysis of regulated inorganic constituents detected in groundwater samples collected at the Big Timber Landfill concluded that there was not a statistically significant difference in downgradient wells compared to upgradient wells except for chloride in well BT-7. The chloride concentration in well BT-7 was statistically significantly greater than chloride concentrations in the background wells.
- A statistical analysis of intrawell temporal chloride concentrations concluded that the April 27, 2001 chloride concentration in well BT-7 is not increasing over time and is most likely naturally occurring.
- The statistically significant increase in chloride concentration in well BT-7 relative to chloride concentrations in upgradient monitoring wells may be due to the naturally occurring higher concentrations of chloride in geologic sediments surrounding well BT-7.
- The landfill cell is located in silty clay sediments and is not located in water bearing sediments. In general, water movement in clay sediments is extremely slow.
- Calculated groundwater flow velocities appear to range from 0.03 ft/day to 1.14 ft/day for the former Big Timber Sanitary Landfill, resulting in travel times ranging from approximately three to eight years for groundwater to move from below the waste cell to downgradient wells BT-6 and BT-7.
- Based on the estimated groundwater travel time, it appears the landfill has not impacted groundwater in the underlying mudstone and sandstone aquifer.
- Based on the groundwater travel times, organic and inorganic groundwater sampling data which indicate no landfill leachate migration, the hydrogeologic setting of predominantly

relatively impermeable shale, mudstone, and silty clay, and the short landfill operating timeframe, Maxim concludes that further groundwater monitoring is not necessary.

## 7.0 LIMITATIONS

This work was performed in accordance with the generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Maxim observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Maxim's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of the monitoring. Other than this, no warranty is implied or intended.

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# FIGURES

# APPENDIX A
## Monitoring Well Logs

Chen-Northern, Inc.

# WELL COMPLETION LOG

State: Montana County: Sweetgrass Project: Big Timber Landfill Hole Name or Number: BT-1 shallow & deep

Legal Location: T 1N R 15E Sec 8 Tract ABDD Descriptive Location: 400' west of draw, downgradient of proposed L.F.

Recorded By: D. Hazen Hole Started: Time: 1045 Date: 05/23/89 Hole Completed: Time: 1545 Date: 05/23/89 Driller: Rock Creek Drilling, Bill Kupfner

Drill Method: Rotary Drilling Fluids Used: Air Pilot Hole Diameter: 8" to 9' Drilled Hole Diameter: 6"

Total Depth Drilled: 80' Total Depth Reamed: ____ Total Depth Cased Below G.S.: ____ Diameter and Type of Casing: 2" PVC

Weight or Gage of Casing: Sch 40 Interval Perforated or Screened Below G.S.: 35.5-25.5 68.5-58.5 Target Aquifer: Fox Hills Formation Packer Type and Depth Below G.S.: N/A

| DURING INSTALLATION WAS: | YES | NO |
|---|---|---|
| Well Developed? | x | |
| Well Test Pumped? | | x |
| Water Samples Taken? | | x |
| Material Samples Taken? | x | |
| E-Logs? | | x |

Method Perforated or Screened

| | |
|---|---|
| | No casing in hole |
| | Open bottom |
| | Slotted with Mill's Knife |
| | Slotted with a torch |
| | Screened by pulling casing |
| | Field saw cut |
| x | Mechanical slots 0.030 (size) |
| | Other (specify) |

| Static Fluid Level Below Measuring Point: | Date/Time Measured: |
|---|---|
| 18.40 | 06/01/89 @ 0850 |
| 18.75 | 05/24/89 @ 0839 |
| 19.27' | 05/23/89 @ 1734 |

Measuring Point Description/Elevation: Top of steel well protector, +2.82 ft. MP Height Above (+/-) or Below G.S.: +2.82'

Well Annulus Completion Description: Dual Completion: 80'-72', cuttings; 72-71.5', Wyo-Ben bentonite; 71.5'-56.6', 10-20 Colorado Silica Sand; 56.6'-38', Wyo-Ben Bentonite (medium); 38'-22', 10-20 Colorado Silica Sand; 22'-11', Wyo-Ben Bentonite (medium)

Well Development Description: Bailed 15 gallons from both the shallow and deep wells; performed bailer Recovery Test on each well.

Remarks: 7" steel surface casing installed to 9 ft. below ground surface. Volclay bentonite pellets placed from 9' to 8' BGS outside of 7" steel and 8' to 1' backfilled with clay/shale cuttings, concrete surface seal installed around steel surface casing. Ground surface at BT-1 assumed elevation of 0.0 ft.

## DRILLING AND LITHOLOGIC LOG

BT-1

| (Depth Below G.S.) | | |
|---|---|---|
| From | To | DRILLING LOG Geological, Drilling, and Water Conditions and Sampling |
| 0 | 1′ | Topsoil/organic material |
| 1′ | 27′ | Gray clay/shale, friable, minor silt and sand, dry minor organics |
| 27′ | 28′ | Silty sandstone, minor water <0.5 gpm, dark red. No recovery with split spoon sampler. |
| 28′ | 38′ | Sandstone and shale interbedded - dark red - making approximately 2 gallons per minute |
| 38′ | 60′ | Gray shale, dry - sealing off water in upper zone (27 to 38′) |
| 60′ | 66′ | Red sandstone with some shale - making 5-6 gpm |
| 66′ | 74′ | Gray shale |
| 74′ | 80′ | Shale with some red sand interbeds, still making 5-6 gpm |

TD = 80′

Chen-Northern, Inc.

# WELL COMPLETION LOG

State: Montana County: Sweetgrass Project: Big Timber Landfill Hole Name or Number: BT-2

Legal Location: T 1N R 15E Sec 8 Tract ABAD Descriptive Location: 100′ west of TP-10, 100′ NE of TP-1, upgradient

Recorded By: D. Hazen Hole Started: Time: 1600 Date: 05/23/89 Hole Completed: Time: 1710 Date: 05/23/89 Driller: Rock Creek, Kupfner

Drill Method: Rotary Drilling Fluids Used: Air/Water Pilot Hole Diameter: 8" to 9′ Drilled Hole Diameter: 6" to 47′, 4-7/8" 47′-90′

Total Depth Drilled: 90′ Total Depth Reamed: --- Total Depth Cased Below G.S.: 42.4′ Diameter and Type of Casing: 2" PVC

Weight or Gage of Casing: Sch. 40 Interval Perforated or Screened Below G.S.: 32.4-42.4 Target Aquifer: Sandstone lenses Packer Type and Depth Below G.S.: N/A

| DURING INSTALLATION WAS: | YES | NO |
|---|---|---|
| Well Developed? | | x |
| Well Test Pumped? | | x |
| Water Samples Taken? | x | |
| Material Samples Taken? | x | |
| E-Logs? | | x |

Method Perforated or Screened

| | |
|---|---|
| | No casing in hole |
| | Open bottom |
| | Slotted with Mill's Knife |
| | Slotted with a torch |
| | Screened by pulling casing |
| | Field saw cut |
| x | Mechanical slots 0.010 (size) |
| | Other (specify) |

| Static Fluid Level Below Measuring Point: | Date/Time Measured: |
|---|---|
| 23.64 | 09/07/89 @ 1130 |
| 23.38 | 06/01/89 @ 1330 |
| 29.20 | 05/24/89 @ 0830 |
| 46.62 | 05/23/89 @ 1713 |

Measuring Point Description/Elevation: Top of steel well protector, 125.6 ft. MP Height Above (+/-) or Below G.S.: +2.7′

Well Annulus Completion Description: 90 - 47′, cuttings; 47′ - 43′, Bentonite chips; 43′ - 30′, 10-20 Colorado Silica Sand; 30′ - 16′, Volplug Bentonite chips

Well Development Description: 9/8/89 - bailed approximately 25 gallons

Remarks: 7" steel surface casing installed to 9′ BGS with bentonite seal. Measuring Point Elevation determined by level survey; Datum (0.0′) is ground surface at well BT-1, well deepened from 47.2′ to 90′ on 9/7/89

SC = 580, T = 11 C, pH = 9.1

## DRILLING AND LITHOLOGIC LOG

BT-2

(Depth Below G.S.)

| From | To | DRILLING LOG Geological, Drilling, and Water Conditions and Sampling |
|---|---|---|
| 0 | 15′ | Overburden, gray silt with clay, ocassional boulder, slightly moist |
| 15′ | 21′ | Brown to light brown shale, friable, dry |
| 21′ | 25′ | Brown shale, friable, dry |
| 25′ | 40′ | Light gray to brown mudstone, dry |
| 40′ | 42′ | Light purple to gray, clay/shale, slightly moist |
| 42′ | 47.2 | Light gray to brown mudstone, slightly moist |
| 47.2′ | 55′ | Gray sandy shale, very hard drilling, several soft intervals |
| 55′ | 65′ | Gray clay shale, friable, easier drilling, let well recover at 59 ft. for 10 minutes, slight amount of water, no noticeable increase from 47′ |
| 65′ | 70′ | Shale/mudstone, dark gray, hard drilling |
| 70′ | 79′ | Clay/shale, soft., slight amount of water, no noticeable increase from 47′, hard drilling 76′ - 77′ and 78′ - 78.5′ |
| 79′ | 90′ | Clay shale/mudstone, gray and gray brown, let sit at 90′ - very slight amount of water, no noticeable increase from 47′ |

Chen-Northern, Inc.

## WELL COMPLETION LOG

State: Montana County: Sweetgrass Project: Big Timber Landfill Hole Name or Number: BT-3

Legal Location: T 1N R 15E Sec 8 Tract AACD Descriptive Location: 230′ SE of Test Pit 12, 30′ N of draw at S edge of site

Recorded By: D. Hazen Hole Started: Time: 1440 Date: 09/07/89 Hole Completed: Time: 1600 Date: 09/07/89 Driller: Rock Creek, Kupfner

Drill Method: Rotary Drilling Fluids Used: Air/Water Pilot Hole Diameter: 8" Reamed Hole Diameter: 4 3/4"

Total Depth Drilled: 21′ Total Depth Reamed: ____ Total Depth Cased Below G.S.: 20.7′ Diameter and Type of Casing: 2" PVC

Weight or Gage of Casing: Sch. 40 Interval Perforated or Screened Below G.S.: 7.7 - 17.7 Target Aquifer: Alluvial Packer Type and Depth Below G.S.: N/A

| DURING INSTALLATION WAS: | YES | NO |
|---|---|---|
| Well Developed? | | |
| Well Test Pumped? | | |
| Water Samples Taken? | x | |
| Material Samples Taken? | x | |
| E-Logs? | | |

Method Perforated or Screened

| | |
|---|---|
| | No casing in hole |
| | Open bottom |
| | Slotted with Mill's Knife |
| | Slotted with a torch |
| | Screened by pulling casing |
| | Field saw cut |
| x | Mechanical slots 0.010 (size) |
| | Other (specify) |

Static Fluid Level Below Measuring Point: 14.67′ 14.81′ Date/Time Measured: 09/08/89 @ 1145 - after overnight stablization 09/07/89 @ 1618

Measuring Point Description/Elevation: Top of steel surface casing MP Height Above (+/-) or Below G.S.: +1.5′

Well Annulus Completion Description: 20.7 - 7.0′, 10-20 Colorado Silica Sand; 7.0 - 5.5, volplug bentonite chips.

Well Development Description: Bailed approximately 20 gallons - would not go dry

Remarks: 11.5′ 7" steel surface casing installed to 9.5′, sealed with Volplug bentonite 1/4" pplets

SC = 1574, T = 11 C

PH = 7.9 @ 11 C

## DRILLING AND LITHOLOGIC LOG

BT-3

(Depth Below G.S.)

| From | To | DRILLING LOG | Geological, Drilling, and Water Conditions and Sampling |
|---|---|---|---|
| 0 | 1′ | Topsoil | |
| 1′ | 3′ | Sand with silt, brown | |
| 3′ | 12′ | Clay with minor fine sand and silt, slightly moist, dark brown, firm | |
| 12′ | 14′ | Sand/gravel - possible sandstone lense, wet | |
| 14′ | 17′ | Clay with silt and firm sand, brown | |
| 17′ | 20′ | Clay, minor silt, slightly moist | |
| | | Making approximately 2 gpm at 20′ | |
| | | TD - 20′ | |

Chen-Northern, Inc.

## WELL COMPLETION LOG

State: Montana County: Sweetgrass Project: Big Timber Landfill Hole Name or Number: BT-4

Legal Location: T 1N R 15E Sec 8 Tract AACA Descriptive Location: Northwest of landfill site in small draw

Recorded By: D. Hazen Hole Started: Time: 1600 Date: 09/07/89 Hole Completed: Time: 1715 Date: 06/07/89 Driller: Rock Creek, Kupfner

Drill Method: Rotary Drilling Fluids Used: Air Pilot Hole Diameter: 8" Reamed Hole Diameter: 4-3/4"

Total Depth Drilled: 50′ Total Depth Reamed: ____ Total Depth Cased Below G.S.: 43.2′ Diameter and Type of Casing: 2" PVC

Weight or Gage of Casing: Sch. 40 Interval Perforated or Screened Below G.S.: 38.2 - 28.2 Target Aquifer: Mudstone Beds Packer Type and Depth Below G.S.: N/A

| DURING INSTALLATION WAS: | YES | NO |
|---|---|---|
| Well Developed? | | |
| Well Test Pumped? | | |
| Water Samples Taken? | x | |
| Material Samples Taken? | x | |
| E-Logs? | | |

Method Perforated or Screened

| | |
|---|---|
| | No casing in hole |
| | Open bottom |
| | Slotted with Mill's Knife |
| | Slotted with a torch |
| | Screened by pulling casing |
| | Field saw cut |
| x | Mechanical slots 0.010 (size) |
| | Other (specify) |

Static Fluid Level Below Measuring Point: 16.62′ 32.40′ Date/Time Measured: 09/08/89 @ 900 09/07/89 @ 1921

Measuring Point Description/Elevation: Top of steel surface casing MP Height Above (+/-) or Below G.S.: +2.0′

Well Annulus Completion Description: 50′ - 41′, caved material; 41′ - 23′, 10-20 Colorado Silica Sand; 23′ - 8′ Volplug medium chips Bentonite

Well Development Description: Bailed approximately 20 gallons - let recover

SWL = 38.6′ after bailing dry

29.5 1056 approximately 5 minutes later

Remarks: 11.5′ surface casing installed with bentonite chip seal.

pH = 8.1 , T = 10.5 C

SC = 1307

BT-4

## DRILLING AND LITHOLOGIC LOG

(Depth Below G.S.)

| From | To | DRILLING LOG Geological, Drilling, and Water Conditions and Sampling |
|---|---|---|
| 0 | 2′ | Silty sand, brown |
| 2′ | 10′ | Clay with minor silt, dark gray brown |
| 10′ | 10.5′ | Hard sandstone |
| 10.5′ | 20′ | Clay/shale - dry - slightly moist, gray brown |
| 20′ | 34′ | Clay - very hard; dry and dusty, light gray, hard |
| 34′ | 39′ | Slightly moist, clay with mudstone clasts. |
| 39′ | 41′ | Clay, brown, very moist<br>No standing water @ 40′ - wet cuttings |
| 41′ | 50′ | Clay, light gray, hard, dry and dusty |
|  |  | (Water on drill steel - 16′ off bottom) |
|  |  | TD - 50′ |

## MONITORING WELL LITHOLOGIC AND COMPLETION LOG

JOB NO.: 89-3020.L

PROJECT: Big Timber Landfill STATE: MT COUNTY: Sweetgrass WELL NO.: BT-5

LEGAL LOCATION: T 1N R 15E S 8 TRACT AACD

DESCRIPTIVE LOCATION: 170' West, 20' North of BT-3

DATE STARTED: 7/19/90 DATE COMPLETED: 7/19/90 DRILLING COMPANY/DRILLER: ESD/Ed Hillman LOGGED BY: D. Hazen

DRILLING METHOD: Rotary BOREHOLE DIAMETER (In): 5 7/8" DRILL FLUIDS USED: Air

TOTAL DEPTH DRILLED (ft): 31' TOTAL DEPTH CASED (ft): 29' INTERVAL PERFORATED OR SCREENED (ft): from: 24.0 to: 29.0 DIAMETER AND TYPE OF CASING: 2" PVC, Sch 40

METHOD OF PERFORATION:
___ Open Hole
___ Open Bottom
___ Saw Slotted
X Mechanical Slots 0.020 (size)
___ OTHER (specify)

DURING WELL CONSTRUCTION WAS/WERE:

| | YES | NO |
|---|---|---|
| WELL DEVELOPED | X | |
| WELL PUMPED | | X |
| WATER SAMPLES COLLECTED | | X |
| MATERIAL SAMPLES COLLECTED | X | |

ANNULAR COMPLETION CHARACTERISTICS

WELL PROTECTOR: Length 15 ft Diam. 6"

LOCK NO.: 2265

SURFACE SEAL: Type: Concrete from: 0 to: 0.5

BACKFILL: Material: Bentonite from: 7 ft to: 21 ft

FILTER PACK: Type: 10-20 Silica from: 21 ft to: 30 ft

STATIC WATER LEVEL: 18.45 MEASURING POINT DATE: 7/20/90 DESCRIPTION/ELEVATION: Top of steel well protector, N side at mark, 4069.25 ft MEASURING POINT RELATIVE TO GROUND SURFACE (+/-): +2.7'

REMARKS: 12.3' of 6" Steel casing installed in boring below ground surface. Finished boring at 1100 hours. Cuttings/caved material from 30 to 31 ft.

| INTERVAL (FT) below ground surface | LITHOLOGIC DESCRIPTION | REMARKS |
|---|---|---|
| 0-8' | Silt, Clay and Sand, light brown | dry |
| 8-10' | Sandstone lense, gray, fine grained | hard drilling |
| 10-15' | Silty Clay, gray to reddish brown, minor sand | slightly moist |
| 15-16' | Sandstone, light gray brown, medium grained | dry |
| 16-19.5' | Silty clay, reddish brown, minor sand | slightly moist - let sit at 17.5' for 5 minutes, dry |
| 19.5-20' | Sandstone lense | dry |
| 20-26 | Silty clay, gray | slightly moist to 25', very moist at 25' |
| 26-27' | Sandstone, dark gray, medium to fine grained | Making 1/2 - 1/4 gpm water |
| 27-31' | Silty clay, gray | slightly moist |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

# MONITORING WELL LITHOLOGIC AND COMPLETION LOG

JOB NO.: 89-3020.L

PROJECT: Big Timber Landfill STATE: MT COUNTY: Sweetgrass WELL NO.: BT-6

LEGAL LOCATION: T 1N R 15E S 8 TRACT ABDD

DESCRIPTIVE LOCATION: 500 feet west of BT-1

DATE STARTED: 7/19/90 DATE COMPLETED: 7/19/90 DRILLING COMPANY/ DRILLER: ESD/Ed Hillman LOGGED BY: D. Hazen

DRILLING METHOD: Rotary BOREHOLE DIAMETER (In): 5 7/8 DRILL FLUIDS USED: Air

TOTAL DEPTH DRILLED (ft): 37' TOTAL DEPTH CASED (ft): 25' INTERVAL PERFORATED OR SCREENED (ft): from: 25.0 to: 30.0 DIAMETER AND TYPE OF CASING: 2" PVC, Sch. 40

METHOD OF PERFORATION:
- ___ Open Hole
- ___ Open Bottom
- ___ Saw Slotted
- X Mechanical Slots 0.020 (size)
- ___ OTHER (specify)

DURING WELL CONSTRUCTION WAS/WERE:

| | YES | NO |
|---|---|---|
| WELL DEVELOPED | X | |
| WELL PUMPED | | X |
| WATER SAMPLES COLLECTED | | X |
| MATERIAL SAMPLES COLLECTED | X | |

ANNULAR COMPLETION CHARACTERISTICS

WELL PROTECTOR: Length 10 ft Diam. 6"

LOCK NO.: 2265

SURFACE SEAL: Type: Concrete from: 0 to: 0.5 ft

BACKFILL: Material: Bentonite from: 6' to: 23'

FILTER PACK: Type: 10-20 silica sand from: 23 ft to: 33 ft

STATIC WATER LEVEL: 22.85 MEASURING POINT DATE: 7/20/90 DESCRIPTION/ ELEVATION: Top of Steel Well Protector, N side at mark, 4057.57 MEASURING POINT RELATIVE TO GROUND SURFACE (+/-): +2.3'

REMARKS: 7.7' of 6" steel in ground

| INTERVAL (FT) below ground surface | LITHOLOGIC DESCRIPTION | REMARKS |
|---|---|---|
| 0-2' | Top soil, silty sand, loose, brown | dry |
| 2-6' | Silty clay, brown to gray | dry |
| 6-7' | Clay/Shale layer | hard drilling |
| 7-12' | Silty clay, dark gray, minor sand | |
| 12-22' | Sandy mudstone, light gray | dry, relatively hard drilling |
| 22-26' | Mudstone with sand, dark gray | dry, moist at 26' |
| 26-33' | Sandy Mudstone, dark gray, likely mudstone with sand interbedded | making water at 26-27', and at 29-29.5' |
| 33-37' | Silty clay, reddish brown | slightly moist, slight oil sheen on mud return |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Form No. 603 (R 2-89)

# WELL LOG REPORT

File No. ______________

*State law requires that the Bureau's copy be filed by the water well driller within 60 days after completion of the well.*

**1. WELL OWNER** WELL
Name CITY OF BIG TIMBER BT-7

**2. CURRENT MAILING ADDRESS**
P.O. BOX 415
BIG TIMBER, MT. 59011

**3. WELL LOCATION**
NW ¼ SW ¼ NE ¼ Section 8
Township 1N N/S Range 15 E E/W County SWT GRASS
Govn't Lot ______, or Lot ______, Block ______
Subdivision Name ______
Tract Number ______

**4. PROPOSED USE:** Domestic ☐ Stock ☐ Irrigation ☐
Other ☒ Specify TOR MONITOR

**5. TYPE OF WORK:**
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

**6. DIMENSIONS:** Diameter of Hole
Dia. 7 7/8 in. from 0 ft. to 5 ft.
Dia. 5 7/8 in. from 5 ft. to 47 ft.
Dia. ______ in. from ______ ft. to ______ ft.

**7. CONSTRUCTION DETAILS:**
Casing; Steel Dia. 6 from +3 ft. to 7'10" ft.
Threaded ☐ Welded ☒ Dia. ______ from ______ ft. to ______ ft.
Type A-53 Wall Thickness .250
Casing; Plastic Dia. 2 from 2'3" ft. to 47 ft.
Weight S.40TFJ Dia. ______ from ______ ft. to ______ ft.
**PERFORATIONS:** Yes ☐ No ☒
Type of perforator used ______
Size of perforations ______ in. by ______ in.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.
**SCREENS:** Yes ☒ No ☐
Manufacturer's Name MONOFLEX
Type ______ Model No. ______
Dia. 2 Slot size .010 from 37 ft. to 47 ft.
Dia. ______ Slot size ______ from ______ ft. to ______ ft.
**GRAVEL PACKED:** Yes ☒ No ☐ Size of gravel 10/20
Gravel placed from 35'11' ft. to 47 ft.
**GROUTED:** To what depth? 35'11" ft.
Material used in grouting bentonite chips

**8. WELL HEAD COMPLETION:**
Pitless Adapter ☐ Yes ☒ No

**9. PUMP** (if installed)
Manufacturer's name ______
Type ______ Model No. ______ HP. ______

**10. WELL TEST DATA**

**The information requested in this section is required for all wells. All depth measurements shall be from the top of the well casing.**

All wells under 100 gpm must be tested for a minimum of one hour and provide the following information:

a) Air ______ Pump ______ Bailer ______
b) Static water level immediately before testing unk. ft. If flowing; closed-in pressure ______ psi. ______ gpm.
Flow controlled by: ______ valve, ______ reducers, ______ other, (specify) ______.
c) Depth at which pump is set for test ______
d) The pumping rate: ______ gpm.
e) Pumping water level ______ ft. at ______ hrs. after pumping began.
f) Duration of test: Pumping time [illegible] hrs.
g) Recovery time [illegible] hrs.
h) Recovery water level [illegible] ft. at ______ hrs. after pumping stopped.

Wells intended to yield 100 gpm or more shall be tested for a period of 8 hours or more. The test shall follow the development of the well, and shall be conducted continuously at a constant discharge at least as great as the intended appropriation. In addition to the above information, water level data shall be collected and recorded on the Department's "Aquifer Test Data" form.

NOTE: All wells shall be equipped with an access port ½ inch minimum or a pressure gauge that will indicate the shut-in pressure of a flowing well. Removable caps are acceptable as access ports.

**11. WAS WELL PLUGGED OR ABANDONED?** ______ Yes x No
If yes, how? ______

**12. WELL LOG**

| Depth (ft.) From | To | Formation |
|---|---|---|
| 0 | 1 | top soil/S.S. cobbles |
| 1 | 5 | S.S. W/silts, lite brwn |
| 5 | 9 | S.S. W/SILT |
| 9 | 11 | FINE SAND, soft |
| 11 | 13 | fine gray/brwn S.S. |
| 13 | 27 | gray sand/mudstone/hard |
| 27 | 31 | purple/black mudstone/sand/ |
| 31 | 33 | hard/fine grain mudstone/pur |
| 33 | 35 | soft/fine grain " " |
| 35 | 37 | soft purple/black sand/fine s |
| 37 | 42 | hard purple/black mudstone |
| 42 | 43 | gray S.S. soft water |
| 43 | 47 | purple clay/mudstone |

ATTACH ADDITIONAL SHEETS IF NECESSARY

**13. DATE COMPLETED** 12/21/95

**14. DRILLER/CONTRACTOR'S CERTIFICATION**
This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

12/26/95
Date

PRO PUMP AND EQUIPMENT,INC./ADI,INC.
Firm Name

2521 S. RAMSHORN LAUREL, MT. 59044
Address

MARVIN W. JEWETT MWC # 271
Signature License No.

***MONTANA DEPARTMENT OF NATURAL RESOURCES & CONSERVATION***
**1520 EAST SIXTH AVENUE HELENA, MONTANA 59620-2301 444-6610**

**DNRC**

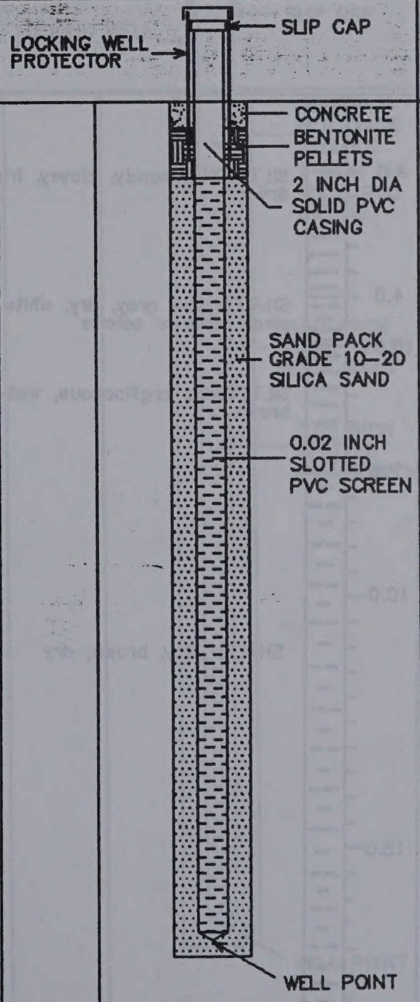
# Huntingdon
Engineering & Environmental, INC.

## LOG OF METHANE MONITORING POINT

PROJECT: BIG TIMBER SANITARY LANDFILL
JOB NO: 94-657
DRILL TYPE: MOBILE B-53, HOLLOWSTEM AUGER
DRILLED BY: W. NIEMI
LOGGED BY: D. TYLER
REMARKS: NONE

WELL NO: BTM-1
SHEET NO: 1 OF 1
LOCATION: 340' N, 50' W OF WELL BT-6
ELEVATION: TOP OF HOLE NOT MEASURED
GROUNDWATER
DATE: HOLE STARTED 10/10/94
COMPLETED 10/10/94

| DEPTH (FT) | GRAPHIC LOG | CLASSIFICATION AND DESCRIPTION | SAMPLE INTERVAL | S.P.T. (IN) (BLOWS/FT.) | ORGANIC VAPOR CONTENT (ppm) | WELL COMPLETION |
|---|---|---|---|---|---|---|
| 5.0 | | SANDSTONE; very fine grained, silty, light tan, dry, occasional clayey zones | | | | |
| 10.0 | | | | | | |
| 15.0 | | | | | | |
| 15.5 | | SILTSTONE; argillaceous, well cemented, brown | | | | |
| 16.5 | | SANDSTONE | | | | |
| 17.0 | | Bottom of Hole = 17.0 feet | | | | |


SLIP CAP
LOCKING WELL PROTECTOR
CONCRETE
BENTONITE PELLETS
2 INCH DIA SOLID PVC CASING
SAND PACK GRADE 10-20 SILICA SAND
0.02 INCH SLOTTED PVC SCREEN
WELL POINT

# Huntingdon

Engineering & Environmental, INC.

## LOG OF METHANE MONITORING POINT

PROJECT: BIG TIMBER SANITARY LANDFILL

JOB NO: 94-657

DRILL TYPE: MOBILE B-53, HOLLOWSTEM AUGER

DRILLED BY: W. NIEMI

LOGGED BY: D. TYLER

REMARKS: NONE

WELL NO: BTM-2

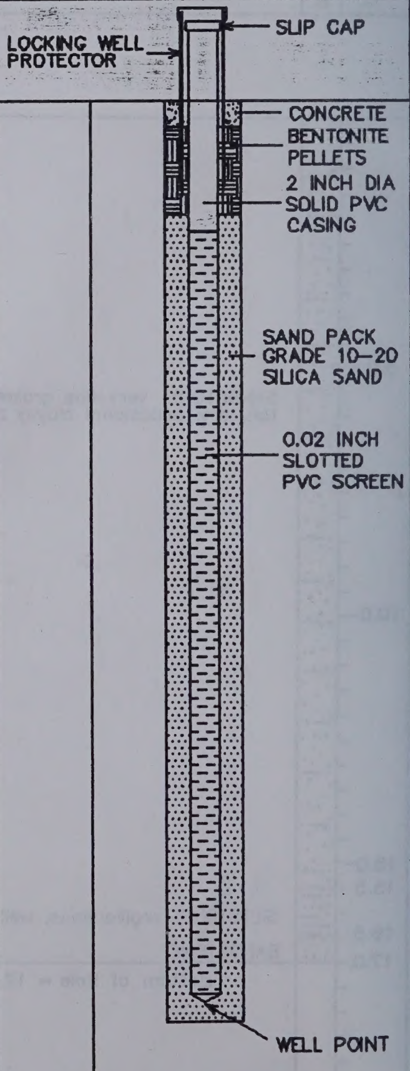
SHEET NO: 1 OF 1

LOCATION: 25' E OF WELL BT-1

ELEVATION: TOP OF HOLE NOT MEASURED
GROUNDWATER

DATE: HOLE STARTED 10/10/94
COMPLETED 10/10/94

| DEPTH (FT) | GRAPHIC LOG | CLASSIFICATION AND DESCRIPTION | SAMPLE INTERVAL | S.P.T. (IN) (BLOWS/FT.) | ORGANIC VAPOR CONTENT (ppm) | WELL COMPLETION |
|---|---|---|---|---|---|---|
| | | SILTSTONE; sandy, clayey, friable, brown, dry | | | | |
| 4.0 | | SHALE; dark gray, dry, white crystals of alkali salts or calcite | | | | |
| 5.0 | | SILTSTONE; argillaceous, well-cemented, brown | | | | |
| 7.5 | | | | | | |
| 10.0 | | SHALE; silty, brown, dry | | | | |
| 15.0 | | | | | | |
| 18.5 | | Bottom of Hole = 18.5 feet | | | | |


SLIP CAP
LOCKING WELL PROTECTOR
CONCRETE
BENTONITE PELLETS
2 INCH DIA SOLID PVC CASING
SAND PACK GRADE 10-20 SILICA SAND
0.02 INCH SLOTTED PVC SCREEN
WELL POINT

# Huntingdon

Engineering & Environmental, INC.

## LOG OF METHANE MONITORING POINT

PROJECT: BIG TIMBER SANITARY LANDFILL

JOB NO: 94-657
DRILL TYPE: MOBILE B-53, HOLLOWSTEM AUGER

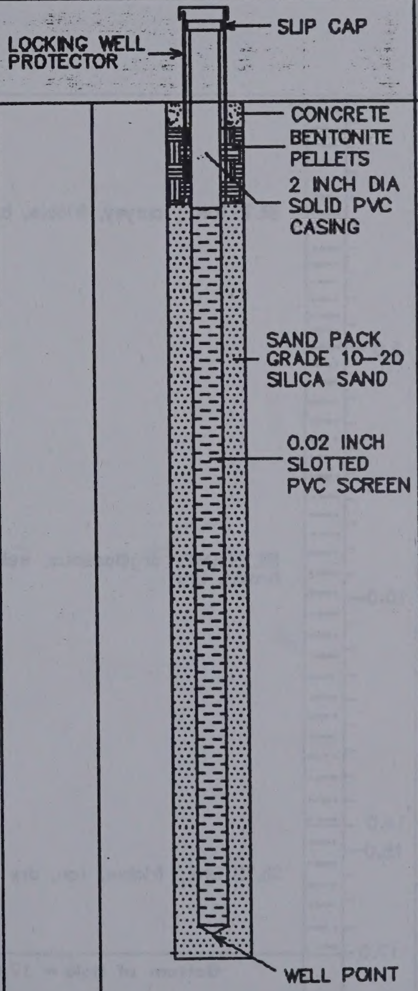
DRILLED BY: W. NIEMI
LOGGED BY: D. TYLER
REMARKS: NONE

WELL NO: BTM-3
SHEET NO: 1 OF 1
LOCATION: 200' SW OF WELL BT-4

ELEVATION: TOP OF HOLE NOT MEASURED
GROUNDWATER

DATE: HOLE STARTED 10/10/94
COMPLETED 10/10/94

| DEPTH (FT) | GRAPHIC LOG | CLASSIFICATION AND DESCRIPTION | SAMPLE INTERVAL | S.P.T. (IN) (BLOWS/FT.) | ORGANIC VAPOR CONTENT (ppm) | WELL COMPLETION |
|---|---|---|---|---|---|---|
| 5.0 | | SILTSTONE; clayey, friable, tan to brown, dry | | | | |
| 10.0 | | | | | | |
| 11.0 | | SHALE; silty, brown, dry | | | | |
| 15.0 | | | | | | |
| 16.0 | | SILTSTONE; argillaceous, well cemented, dark brown | | | | |
| 17.0 | | Bottom of Hole = 17.0 feet | | | | |


SLIP CAP
LOCKING WELL PROTECTOR
CONCRETE
BENTONITE PELLETS
2 INCH DIA SOLID PVC CASING
SAND PACK GRADE 10-20 SILICA SAND
0.02 INCH SLOTTED PVC SCREEN
WELL POINT

# Huntingdon

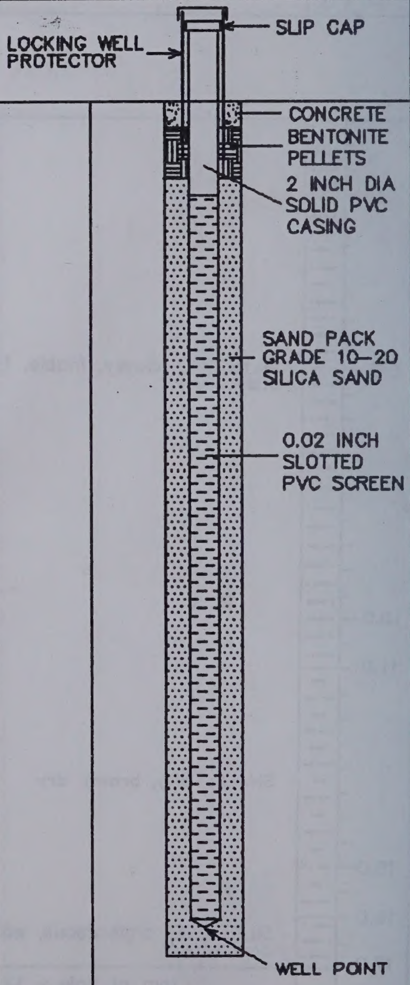
Engineering & Environmental, INC.

## LOG OF METHANE MONITORING POINT

PROJECT: BIG TIMBER SANITARY LANDFILL
JOB NO: 94-657
DRILL TYPE: MOBILE B-53, HOLLOWSTEM AUGER
DRILLED BY: W. NIEMI
LOGGED BY: D. TYLER
REMARKS: NONE

WELL NO: BTM-4
SHEET NO: 1 OF 1
LOCATION: 175' E OF WELL BT-2
ELEVATION: TOP OF HOLE NOT MEASURED
GROUNDWATER
DATE: HOLE STARTED 10/10/94
COMPLETED 10/10/94

| DEPTH (FT) | GRAPHIC LOG | CLASSIFICATION AND DESCRIPTION | SAMPLE INTERVAL | S.P.T. (IN) (BLOWS/FT.) | ORGANIC VAPOR CONTENT (ppm) | WELL COMPLETION |
|---|---|---|---|---|---|---|
| | | SILTSTONE; clayey, friable, brown, dry | | | | |
| 5.0 | | | | | | |
| | | SILTSTONE; argillaceous, well cemented, brown, dry | | | | |
| 10.0 | | | | | | |
| 14.5 | | | | | | |
| 15.0 | | SILTSTONE; friable, tan, dry | | | | |
| 17.0 | | Bottom of Hole = 17.0 feet | | | | |


SLIP CAP
LOCKING WELL PROTECTOR
CONCRETE
BENTONITE PELLETS
2 INCH DIA SOLID PVC CASING
SAND PACK GRADE 10-20 SILICA SAND
0.02 INCH SLOTTED PVC SCREEN
WELL POINT

# APPENDIX B
## Groundwater Elevation Data

# GROUNDWATER ELEVATION MEASUREMENTS
# BIG TIMBER SANITARY LANDFILL
# BIG TIMBER, MONTANA
# MAXIM PROJECT NO. 9731053-100

ALL MEASUREMENTS IN FEET

WELL NO. BT-1S
REFERENCE ELEVATION: 4067.78
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.42 | 4049.36 | | |
| 07/19/90 | 19.08 | 4048.70 | -0.66 | |
| 10/04/94 | 17.06 | 4050.72 | 2.02 | |
| 01/30/95 | 17.92 | 4049.86 | -0.86 | |
| 02/27/95 | 14.87 | 4052.91 | 3.05 | |
| 03/27/95 | 15.13 | 4052.65 | -0.26 | |
| 04/28/95 | 15.98 | 4051.80 | -0.85 | |
| 05/26/95 | 15.17 | 4052.61 | 0.81 | |
| 06/30/95 | 15.50 | 4052.28 | -0.33 | |
| 07/31/95 | 15.92 | 4051.86 | -0.42 | |
| 08/22/95 | 16.25 | 4051.53 | -0.33 | |
| 09/30/95 | 16.83 | 4050.95 | -0.58 | |
| 10/31/95 | 17.33 | 4050.45 | -0.50 | |
| 11/28/95 | 17.33 | 4050.45 | 0.00 | |
| 12/26/95 | 17.50 | 4050.28 | -0.17 | Well Resurveyed; New Elevation = 4067.67 |
| 01/16/96 | 17.51 | 4050.27 | -0.01 | |
| 10/08/96 | 16.67 | 4051.00 | 0.73 | |
| 04/29/97 | 16.00 | 4051.67 | 0.67 | |
| 12/10/97 | 15.71 | 4051.96 | 0.29 | |
| 11/19/98 | 17.64 | 4050.03 | -1.93 | |
| 05/06/99 | 18.15 | 4049.52 | -0.51 | |
| 10/20/99 | 19.54 | 4048.13 | -1.39 | |
| 04/25/00 | 20.47 | 4047.20 | -0.93 | |
| 10/18/00 | 20.96 | 4046.71 | -0.49 | |
| 04/27/01 | 20.41 | 4047.26 | 0.55 | |

WELL NO. BT-1D
REFERENCE ELEVATION: 4067.78
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.36 | 4049.42 | | |
| 07/19/90 | 19.23 | 4048.55 | -0.87 | |
| 10/04/94 | 17.30 | 4050.48 | 1.93 | |
| 01/30/95 | 17.83 | 4049.95 | -0.53 | |
| 02/27/95 | 15.37 | 4052.41 | 2.46 | |
| 03/27/95 | 15.29 | 4052.49 | 0.08 | |
| 04/28/95 | 17.60 | 4050.18 | -2.31 | |
| 05/26/95 | 17.50 | 4050.28 | 0.10 | |
| 06/30/95 | 17.08 | 4050.70 | 0.42 | |
| 07/31/95 | 16.66 | 4051.12 | 0.42 | |
| 08/22/95 | 17.16 | 4050.62 | -0.50 | |
| 09/30/95 | 17.25 | 4050.53 | -0.09 | |
| 10/31/95 | 17.92 | 4049.86 | -0.67 | |
| 11/28/95 | 17.33 | 4050.45 | 0.59 | |
| 12/26/95 | 17.58 | 4050.20 | -0.25 | Well Resurveyed; New Elevation = 4067.43 |
| 01/16/96 | 17.38 | 4050.40 | 0.20 | |
| 10/08/96 | 16.58 | 4050.85 | 0.45 | |
| 04/29/97 | NM | NM | NM | |
| 12/10/97 | 15.85 | 4051.58 | 0.73 | |
| 11/19/98 | 18.07 | 4049.36 | -2.22 | |
| 05/06/99 | 18.85 | 4048.58 | -0.78 | |
| 10/20/99 | 19.28 | 4048.15 | -0.43 | |
| 04/25/00 | 19.75 | 4047.68 | -0.47 | |
| 10/18/00 | 19.77 | 4047.66 | -0.02 | |
| 04/27/01 | 21.92 | 4045.51 | -2.15 | |

WELL NO. BT-2
REFERENCE ELEVATION: 4090.55
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 23.64 | 4066.91 | | |
| 07/19/90 | 27.29 | 4063.26 | -3.65 | |
| 10/04/94 | 26.34 | 4064.21 | 0.95 | |
| 01/30/95 | 23.71 | 4066.84 | 2.63 | |
| 02/27/95 | 23.50 | 4067.05 | 0.21 | |
| 03/27/95 | 23.33 | 4067.22 | 0.17 | |
| 04/28/95 | 25.03 | 4065.52 | -1.70 | |
| 05/26/95 | 24.42 | 4066.13 | 0.61 | |
| 06/30/95 | 24.50 | 4066.05 | -0.08 | |
| 07/31/95 | 25.00 | 4065.55 | -0.50 | |
| 08/22/95 | 25.00 | 4065.55 | 0.00 | |
| 09/30/95 | 25.16 | 4065.39 | -0.16 | |
| 10/31/95 | 25.42 | 4065.13 | -0.26 | |
| 11/28/95 | 25.58 | 4064.97 | -0.16 | |
| 12/26/95 | 25.83 | 4064.72 | -0.25 | Well Resurveyed; New Elevation = 4090.35 |
| 01/16/96 | 25.61 | 4064.74 | 0.02 | |
| 10/08/96 | 25.40 | 4064.95 | 0.21 | |
| 04/29/97 | 25.34 | 4065.01 | 0.06 | |
| 12/10/97 | 25.46 | 4064.89 | -0.12 | |
| 11/19/98 | 26.58 | 4063.77 | -1.12 | |
| 05/06/99 | 27.02 | 4063.33 | -0.44 | |
| 10/20/99 | 27.37 | 4062.98 | -0.35 | |
| 04/25/00 | 27.78 | 4062.57 | -0.41 | |
| 10/18/00 | 27.96 | 4062.39 | -0.18 | |
| 04/27/01 | 28.25 | 4062.10 | -0.29 | |

WELL NO. BT-3
REFERENCE ELEVATION: 4069.31
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 14.67 | 4054.64 | | |
| 07/19/90 | 15.70 | 4053.61 | -1.03 | |
| 10/04/94 | 13.68 | 4055.63 | 2.02 | |
| 01/30/95 | 12.66 | 4056.65 | 1.02 | |
| 02/27/95 | 12.04 | 4057.27 | 0.62 | |
| 03/27/95 | 12.33 | 4056.98 | -0.29 | |
| 04/28/95 | 12.94 | 4056.37 | -0.61 | |
| 05/26/95 | 12.79 | 4056.52 | 0.15 | |
| 06/30/95 | 11.83 | 4057.48 | 0.96 | |
| 07/31/95 | 12.16 | 4057.15 | -0.33 | |
| 08/22/95 | 12.42 | 4056.89 | -0.26 | |
| 09/30/95 | 12.75 | 4056.56 | -0.33 | |
| 10/31/95 | 12.92 | 4056.39 | -0.17 | |
| 11/28/95 | 13.00 | 4056.31 | -0.08 | |
| 12/26/95 | 13.08 | 4056.23 | -0.08 | Well Resurveyed; New Elevation = 4069.12 |
| 01/16/96 | 13.06 | 4056.25 | 0.02 | |
| 10/08/96 | 12.40 | 4056.72 | 0.47 | |
| 04/29/97 | 11.23 | 4057.89 | 1.17 | |
| 12/10/97 | 10.65 | 4058.47 | 0.58 | |
| 11/19/98 | 14.69 | 4054.43 | -4.04 | |
| 05/06/99 | 15.54 | 4053.58 | -0.85 | |
| 10/20/99 | 16.62 | 4052.50 | -1.08 | |
| 04/25/00 | 17.60 | 4051.52 | -0.98 | |
| 10/18/00 | 17.87 | 4051.25 | -0.27 | |
| 04/27/01 | 18.94 | 4050.18 | -1.07 | |

WELL NO. BT-4
REFERENCE ELEVATION: 4087.64
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 16.62 | 4071.02 | | |
| 07/19/90 | 16.79 | 4070.85 | -0.17 | |
| 10/04/94 | 15.71 | 4071.93 | 1.08 | |
| 01/30/95 | 14.66 | 4072.98 | 1.05 | |
| 02/27/95 | 13.71 | 4073.93 | 0.95 | |
| 03/27/95 | 13.96 | 4073.68 | -0.25 | |
| 04/28/95 | 15.30 | 4072.34 | -1.34 | |
| 05/26/95 | 14.42 | 4073.22 | 0.88 | |
| 06/30/95 | 15.00 | 4072.64 | -0.58 | |
| 07/31/95 | 14.58 | 4073.06 | 0.42 | |
| 08/22/95 | 15.58 | 4072.06 | -1.00 | |
| 09/30/95 | 15.16 | 4072.48 | 0.42 | |
| 10/31/95 | 15.92 | 4071.72 | -0.76 | |
| 11/28/95 | 16.00 | 4071.64 | -0.08 | |
| 12/26/95 | 16.17 | 4071.47 | -0.17 | Well Resurveyed; New Elevation = 4087.45 |
| 01/16/96 | 16.04 | 4071.60 | 0.13 | |
| 10/08/96 | 15.51 | 4071.94 | 0.34 | |
| 04/29/97 | 15.31 | 4072.14 | 0.20 | |
| 12/10/97 | 15.68 | 4071.77 | -0.37 | |
| 11/19/98 | 16.34 | 4071.11 | -0.66 | |
| 05/06/99 | 16.93 | 4070.52 | -0.59 | |
| 10/20/99 | 17.07 | 4070.38 | -0.14 | |
| 04/25/00 | 17.42 | 4070.03 | -0.35 | |
| 10/18/00 | 17.88 | 4069.57 | -0.46 | |
| 04/27/01 | 18.31 | 4069.14 | -0.43 | |

WELL NO. BT-5
REFERENCE ELEVATION: 4069.25
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 07/19/90 | 18.45 | 4050.80 | | |
| 10/04/94 | 16.04 | 4053.21 | 2.41 | |
| 01/30/95 | 14.00 | 4055.25 | 2.04 | |
| 02/27/95 | 12.08 | 4057.17 | 1.92 | |
| 03/27/95 | 13.75 | 4055.50 | -1.67 | |
| 04/28/95 | 15.25 | 4054.00 | -1.50 | |
| 05/26/95 | 14.83 | 4054.42 | 0.42 | |
| 06/30/65 | 14.58 | 4054.67 | 0.25 | |
| 07/31/95 | 14.50 | 4054.75 | 0.08 | |
| 08/22/95 | 14.83 | 4054.42 | -0.33 | |
| 09/30/95 | 15.25 | 4054.00 | -0.42 | |
| 10/31/95 | 15.42 | 4053.83 | -0.17 | |
| 11/28/95 | 15.42 | 4053.83 | 0.00 | |
| 12/26/95 | 15.58 | 4053.67 | -0.16 | Well Resurveyed; New Elevation = 4068.96 |
| 01/16/96 | 15.55 | 4053.70 | 0.03 | |
| 10/08/96 | 14.71 | 4054.25 | 0.55 | |
| 04/29/97 | 13.47 | 4055.49 | 1.24 | |
| 12/10/97 | 12.97 | 4055.99 | 0.50 | |
| 11/19/98 | 16.99 | 4051.97 | -4.02 | |
| 05/06/99 | 17.60 | 4051.36 | -0.61 | |
| 10/20/99 | 18.82 | 4050.14 | -1.22 | |
| 04/25/00 | 19.24 | 4049.72 | -0.42 | |
| 10/18/00 | 20.38 | 4048.58 | -1.14 | |
| 4/27/01 | 20.69 | 4048.27 | -0.31 | |

WELL NO. BT-6
REFERENCE ELEVATION: 4057.57
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 07/19/90 | 22.65 | 4034.92 | | |
| 10/04/94 | 17.88 | 4039.69 | 4.77 | |
| 01/30/95 | 22.83 | 4034.74 | -4.95 | |
| 02/27/95 | 24.46 | 4033.11 | -1.63 | |
| 03/27/95 | 24.92 | 4032.65 | -0.46 | |
| 04/28/95 | 27.25 | 4030.32 | -2.33 | |
| 05/26/95 | 26.92 | 4030.65 | 0.33 | |
| 06/30/95 | 26.08 | 4031.49 | 0.84 | |
| 07/31/95 | 25.58 | 4031.99 | 0.50 | |
| 08/22/95 | 25.92 | 4031.65 | -0.34 | |
| 09/30/95 | 26.00 | 4031.57 | -0.08 | |
| 10/31/95 | 25.75 | 4031.82 | 0.25 | |
| 11/28/95 | 25.92 | 4031.65 | -0.17 | |
| 12/26/95 | 26.75 | 4030.82 | -0.83 | Well Resurveyed; New Elevation = 4057.69 |
| 01/16/96 | 26.91 | 4030.66 | -0.16 | |
| 10/08/96 | 21.60 | 4036.09 | 5.43 | |
| 04/29/97 | 27.21 | 4030.48 | -5.61 | |
| 12/10/97 | 23.79 | 4033.90 | 3.42 | |
| 11/19/98 | 25.53 | 4032.16 | -1.74 | |
| 05/06/99 | 28.37 | 4029.32 | -2.84 | |
| 10/20/99 | 25.52 | 4032.17 | 2.85 | |
| 04/25/00 | 28.82 | 4028.87 | -3.30 | |
| 10/18/00 | 22.93 | 4034.76 | 5.89 | |
| 04/27/01 | 29.02 | 4028.67 | -6.09 | |

WELL NO. BT-7
REFERENCE ELEVATION: 4085.71
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 12/26/95 | 39.58 | 4046.13 | | |
| 01/16/96 | 38.47 | 4047.24 | 1.11 | |
| 10/08/96 | 38.00 | 4047.71 | 0.47 | |
| 04/29/97 | 38.21 | 4047.50 | -0.21 | |
| 12/10/97 | 38.15 | 4047.56 | 0.06 | |
| 11/19/98 | 39.20 | 4046.51 | -1.05 | |
| 05/06/99 | 39.60 | 4046.11 | -0.40 | |
| 10/20/99 | 39.71 | 4046.00 | -0.11 | |
| 04/25/00 | 39.98 | 4045.73 | -0.27 | |
| 10/18/00 | 39.35 | 4046.36 | 0.63 | |
| 04/27/01 | 40.08 | 4045.63 | -0.73 | |

LEGEND

NM: Not Measured

# APPENDIX C
## Groundwater Velocity and Travel Time Calculations

# Groundwater Velocity and Travel Time Calculations
# Big Timber Landfill
April 27, 2001

## VELOCITY

Darcy's Law: $\upsilon = K\iota / \eta$

$\upsilon$ = interstitial velocity
K = hydraulic conductivity
$\iota$ = hydraulic gradient
$\eta$ = effective porosity

| | |
|---|---|
| K = 0.31 to 0.85 feet/day | (Chen-Northern, 1990) |
| $\iota$ = 0.067 | (Figure 5) |
| $\eta$ = 0.20 | (estimate; Chen-Northern, 1990) |

Low Range

$\upsilon$ = (0.31)(0.067) / 0.20 = 0.10 feet/day

High Range

$\upsilon$ = (0.85)(0.067) / 0.20 = 0.29 feet/day

## TRAVEL TIME

T = d / $\upsilon$

T = groundwater travel time
$\upsilon$ = interstitial velocity
d = average distance from landfill cell to downgradient well

$\upsilon$ = 0.10 to 0.29 feet/day
d = 300 feet

Low Range

T = 300 / 0.10 = 3,000 days or 8.2 years

High Range

T = 300 / 0.29 = 1,034 days or 2.8 years

# APPENDIX D
# Groundwater Sampling Logs

1310 – 1430

# GROUNDWATER SAMPLING LOG

Project: BIG TIMBER LF Sample Date 4-27-01 Time: 1420 Well ID: BT-1S

Personnel: MELL Weather: PC, W. WIND @ ~10mpH, ~75°

Casing Diameter/Type: 2" PVC Measuring Point Description: AS MARKED ON PVC

Well Depth (feet below measuring point): 37.0' Depth to Water 20.41 ft water

Screen: Depth to Product NA

## WELL EVACUATION

Method: [ ] Mechanical Bailer, [ ] Galvanized Bailer, [ ] PVC Bailer, [✓ [ ] Disp. Polyethylene Bailer], [ ] SST Bailer, [ ] Submersible Pump, [ ] QED Low Flow, [ ] Other:

16.59 ft. water x .163 gal./ft * = one casing volume 2.7 gals. x 3 = purge volume 8.1 gals.

SCH 40 Pipe * 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x C²

Comments:

13:20

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| 1324 | 1 | 11.3 | 8.70 | 552 | -36 | 2.2 |
| 1330 | 3 | 11.1 | 8.76 | 512 | +35 | 2.3 |
| 1335 | 5 | 11.1 | 8.81 | 556 | +74 | 1.9 |
| 1343 | 6.5 | 10.9 | 8.98 | 405 | -76 | 1.2 |
|  | 8.0 | 10.9 | 9.15 | 540 | -78 | .7 |

## WELL SAMPLING

Sampling Method: [✓ [ ] Disposable Poly Bailer], [ ] Submersible Pump, [ ] QED Low Flow, [ ] Other: Sample Type: [✓ [ ] Natural], [ ] Duplicate, [ ] Field Blank

|  | Parameter | Sample Container | Preservative |
|---|---|---|---|
| [ ] | BTEX | (2) 40 ml VOA | Hydrochloric acid |
| [ ] | MTBE | Extracted from BTEX VOA | Hydrochloric acid |
| [ ] | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid |
| [ ] | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid |
| [ ] | Methane | (1) 40 ml VOA | Hydrochloric acid |
| [ ] | ~~Sulfate~~ COMMON IONS | (1) 250 ml poly plastic | None |
| [ ] | HACH | (1) 1-liter poly plastic | None |
| [ ] | ~~Lead~~ DISS. METALS | (1) ~~425 ml~~ poly plastic 250 ml | Nitric acid |
| [ ] | VPH | (3) 40 ml VOA | Hydrochloric acid |
| [ ] | EPH | (2) 1-liter amber glass | Hydrochloric acid |
| [ ] | PAHs | (2) 1-liter amber glass | None |
| [ ] | VOC'S | (3) 40 ml VOA | Hydrochloric acid |
| [ ] | CYANIDE* | 250 ml POLY | NaOH |
| [ ] | NUTRIENTS | " | $H_2SO_4$ |

[✓ Filtered: [ ] Yes], [ ] No

Laboratory: Quanterra Environmental Services: [ ] Arvada, CO, [ ] Austin, TX, [✓ [ ] Northern Analytical] Other

Chain-of-Custody: [✓ ☒ Yes], [ ] No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | 8314 | 4-27-01 |
| SC | 991300 | ↓ |
| ORP | 9023 |  |
| DO | 96F50737 |  |

Decontamination

Potable Water: Yes [ ] [✓ No [ ]] Nitric Acid: [✓ Yes [ ]] No [ ]

Liquinox: [✓ Yes [ ]] No [ ] DI Water: [✓ Yes [ ]] No [ ]

Methanol: [✓ Yes [ ]] No [ ]

Comments:

# GROUNDWATER SAMPLING LOG (1420) ACTUAL

Project: BIG TIMBER LF Sample Date 4-27-01 Time: 1400 Well ID: BT-101

Personnel: MELI Weather: PC, LIGHT WIND, ~75°

Casing Diameter/Type: _____ Measuring Point Description: _____

Well Depth (feet below measuring point): _____ Depth to Water ~~40.08~~ ft water

Screen: _____ Depth to Product _____

---

## WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☒ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, ☐ QED Low Flow, ☐ Other: _____
_____ ft. water x _____ gal./ft.* = one casing volume _____ gals. x 3 = purge volume _____ gals.

SCH 40 Pipe* 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x C²

Comments: DUPLICATE SAMPLE OF WELL BT-1S

### EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
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| | | | | | | |
| | | | | | | |
| | | | | | | |
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| | | | | | | |
| | | | | | | |

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## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, ☐ Submersible Pump, ☐ QED Low Flow, ☐ Other: _____ Sample Type: ☐ Natural, ☒ Duplicate, ☐ Field Blank

| | Parameter | Sample Container | Preservative |
|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid |
| ☐ | Methane | (1) 40 ml VOA | Hydrochloric acid |
| ☒ | ~~Sulfate~~ COMMON IONS | (1) 250 ml poly plastic | ~~None~~ |
| ☐ | HACH | (1) 1-liter poly plastic | None |
| ☒ | ~~Lead~~ DISS METALS | (1) ~~125 ml~~ poly plastic 250 | ~~Nitric acid~~ |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid |
| ☐ | PAHs | (2) 1-liter amber glass | None |
| ☒ | VOC'S | (3) 40 ml VOA | Hydrochloric acid |
| ☐ | CYANIDE | 250 ml poly | NaOH |
| ☐ | NUTRIENTS | " | $H_2SO_4$ |

Filtered: ☒ Yes, ☐ No

Laboratory: Quanterra Environmental Services: ☐ Arvada, CO, ☐ Austin, TX, ☒ Northern Analytical Other _____

Chain-of-Custody: ☒ Yes ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | | |
| SC | | |
| ORP | | |
| DO | | |

Decontamination

Potable Water: Yes ☐ [✓ No ☐]
Liquinox: [✓ Yes ☐] No ☐
Methanol: [✓ Yes ☐] No ☐
Nitric Acid: [✓ Yes ☐] No ☐
DI Water: [✓ Yes ☐] No ☐

Comments: _____

1200-1310

# GROUNDWATER SAMPLING LOG

Project: BIG TIMBER Sample Date 4-27-01 Time: 1300 Well ID: BT-2

Personnel: MEH Weather: PC. LIGHT WIND, ~70°

Casing Diameter/Type: 2" PVC Measuring Point Description: AS MARKED ON PVC

Well Depth (feet below measuring point): 43.0' Depth to Water 28.25' ft water

Screen: Depth to Product NA

## WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☒ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, ☐ QED Low Flow, ☐ Other:

14.75 ft. water x .163 gal./ft * = one casing volume 2.4 gals. x 3 = purge volume 7.2 gals.

SCH 40 Pipe * 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Comments:

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| 1216 | 1 | 11.8 | 8.17 | 538 | -170 | 1.0 |
| 1223 | 2 | 11.2 | 8.27 | 559 | -151 | 1.2 |
| 1227 | 3 | 11.0 | 8.67 | 568 | -143 | .6 |
| 1233 | 4 | 11.1 | 8.73 | 567 | -99 | .4 |
| 1237 | 5 | 11.0 | 8.77 | 584 | -99 | .5 |
| 1240 | 6 | 11.0 | 8.79 | 579 | -98 | .3 |
|  | 7 | 11.0 | 8.79 | 580 | -88 | .2 |

## WELL SAMPLING

Sampling Method: ☒ Disposable Poly Bailer, ☐ Submersible Pump, ☐ QED Low Flow, ☐ Other: Sample Type: [✓ ☐ Natural], ☐ Duplicate, ☐ Field Blank

|  | Parameter | Sample Container | Preservative |
|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid |
| ☐ | Methane | (1) 40 ml VOA | Hydrochloric acid |
| ☑ | ~~Sulfate~~ COMMON IONS | (1) 250 ml poly plastic | None |
| ☐ | HACH | (1) 1-liter poly plastic | None |
| ☑ | ~~Lead~~ DISS METALS | (1) ~~125 ml~~ poly plastic 250 ml | Nitric acid |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid |
| ☐ | PAHs | (2) 1-liter amber glass | None |
| ☑ | VOC'S | (3) 40 ml VOA | Hydrochloric acid |
| ☐ | Cyanide | 250 ml | NaOH |
| ☐ | Nutrients | " | H2SO4 |

Filtered: ☒ Yes ☐ No

Laboratory: Quanterra Environmental Services: ☐ Arvada, CO, ☐ Austin, TX, [✓ ☐ Northern Analytical] Other

Chain-of-Custody: [✓ ☐ Yes] ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | 8314 | 4-27 |
| SC | 991300 | ↓ |
| ORP | 9023 | ↓ |
| DO | 96F50737 | ↓ |

Decontamination

Potable Water: Yes ☐ [✓ No ☐]

Liquinox: [✓ Yes ☐] No ☐

Methanol: [✓ Yes ☐] No ☐

Nitric Acid: [✓ Yes ☐] No ☐

DI Water: [✓ Yes ☐] No ☐

Comments:

# GROUNDWATER SAMPLING LOG

Project: BIG TIMBER LF Sample Date 4-27-01 Time: 1545 Well ID: BT-6

Personnel: MELL Weather: PC LIGHT WIND ~70°

Casing Diameter/Type: 2" PVC Measuring Point Description: AS MARKED

Well Depth (feet below measuring point): 32.2 Depth to Water 29.02 ft water

Screen: Depth to Product

BLK 4-23 0800

## WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, [✓ Disp. Polyethylene Bailer], ☐ SST Bailer, ☐ Submersible Pump, ☐ QED Low Flow, ☐ Other: ______ ft. water x ______ gal./ft * = one casing volume .5 gals. x 3 = purge volume 1.5 gals.

SCH 40 Pipe* 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Comments:

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| | .5 | 12.9 | 8.05 | 662 | – | 2.0 |
| | 1.0 | 12.9 | 8.16 | 638 | – | 1.8 |
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## WELL SAMPLING

Sampling Method: [✓ Disposable Poly Bailer], ☐ Submersible Pump, ☐ QED Low Flow, ☐ Other: ______ Sample Type: [✓ Natural], ☐ Duplicate, ☐ Field Blank

| | Parameter | Sample Container | Preservative |
|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid |
| ☐ | Methane | (1) 40 ml VOA | Hydrochloric acid |
| ☐ | ~~Sulfate~~ COMMON IONS | (1) 250 ml poly plastic | None |
| ☐ | HACH | (1) 1-liter poly plastic | None |
| ☐ | ~~Lead~~ DIS METALS | (1) ~~[illegible]~~ poly plastic 250ml | Nitric acid |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid |
| ☐ | PAHs | (2) 1-liter amber glass | None |
| ☐ | VOC'S | (3) 40 ml VOA | Hydrochloric acid |
| ☐ | CYANIDE | 250ml POLY | NaOH |
| ☐ | NUTRIENTS | 250ml POLY | $H_2SO_4$ |

Filtered: ☒ Yes, ☐ No

Laboratory: Quanterra Environmental Services: ☐ Arvada, CO, ☐ Austin, TX, [✓ Northern Analytical Other] ______

Chain-of-Custody: ☒ Yes, ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | 8314 | 4-27-01 |
| SC | 991300 | ↓ |
| ORP | – | – |
| DO | 96E50737 | ↓ |

Decontamination

Potable Water: Yes ☐ [✓ No]

Liquinox: [✓ Yes] No ☐

Methanol: [✓ Yes] No ☐

Nitric Acid: [✓ Yes] No ☐

DI Water: [✓ Yes] No ☐

Comments:

1430 - 1525

# GROUNDWATER SAMPLING LOG

Project: BIG TIMBER LF Sample Date: 4-27-01 Time: 1515 Well ID: BT-7

Personnel: MEU Weather: PC

Casing Diameter/Type: 2" PVC Measuring Point Description: AS MARKED

Well Depth (feet below measuring point): 49.7' Depth to Water 40.08 ft water

Screen: Depth to Product NA

## WELL EVACUATION

Method: ☐ Mechanical Bailer, ☐ Galvanized Bailer, ☐ PVC Bailer, ☒ Disp. Polyethylene Bailer, ☐ SST Bailer, ☐ Submersible Pump, ☐ QED Low Flow, ☐ Other:

9.62 ft. water x 1.56 gal/ft * = one casing volume 4.7 gals. x 3 = purge volume gals.

SCH 40 Pipe * 2" well = 0.163 gal./ft. 4" well = 0.653 gal./ft. 6" well = 1.469 gal./ft. 8" well = 2.611 gal./ft. Any Well C feet in diameter = 5.875 x $C^2$

Comments:

## EVACUATION DATA

| Time | Gallons | Temperature | pH | SC | ORP | DO |
|---|---|---|---|---|---|---|
| 1447 | 1 | 12.2 | 7.71 | 1316 | -176 | 1.1 |
|  | 2 | 12.1 | 7.66 | 1320 | -119 | .7 |
| 1454 | 3 | 12.0 | 7.69 | 1312 | -88 | .5 |
| 1459 | 4 | 12.0 | 7.67 | 1313 | -110 | .3 |
| 1503 | 5 | 12.0 | 7.67 | 1310 | -102 | .3 |

## WELL SAMPLING

Sampling Method: [✓ Disposable Poly Bailer], ☐ Submersible Pump, ☐ QED Low Flow, ☐ Other: Sample Type: [✓ Natural], ☐ Duplicate, ☐ Field Blank

|  | Parameter | Sample Container | Preservative |
|---|---|---|---|
| ☐ | BTEX | (2) 40 ml VOA | Hydrochloric acid |
| ☐ | MTBE | Extracted from BTEX VOA | Hydrochloric acid |
| ☐ | GRO as Gasoline | (2) 40 ml VOA | Hydrochloric acid |
| ☐ | DRO as Diesel | (2) 1-liter amber glass | Sulfuric acid |
| ☐ | Methane | (1) 40 ml VOA | Hydrochloric acid |
| ☒ | ~~Sulfate~~ COMMON IONS | (1) 250 ml poly plastic | None |
| ☐ | HACH | (1) 1-liter poly plastic | None |
| ☒ | ~~Lead~~ DISS METALS | (1) ~~425 ml~~ poly plastic 250ml | Nitric acid |
| ☐ | VPH | (3) 40 ml VOA | Hydrochloric acid |
| ☐ | EPH | (2) 1-liter amber glass | Hydrochloric acid |
| ☐ | PAHs | (2) 1-liter amber glass | None |
| ☐ | VOC'S | (3) 40 ml VOA | Hydrochloric acid |
| ☐ | CYANIDE | 250 ml poly | NaOH |
| ☐ | NUTRIENTS | " | $H_2SO_4$ |

Filtered: [✓ Yes] ☐ No

Laboratory: Quanterra Environmental Services: ☐ Arvada, CO, ☐ Austin, TX [✓ Northern Analytical] Other

Chain-of-Custody: [✓ Yes], ☐ No

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | 8314 | 4-27 |
| SC | 991300 |  |
| ORP | 9023 |  |
| DO | 96F50737 | ↓ |

Decontamination

Potable Water: Yes ☐ [✓ No]

Liquinox: [✓ Yes] No ☐

Methanol: [✓ Yes] No ☐

Nitric Acid: [✓ Yes] No ☐

DI Water: [✓ Yes] No ☐

Comments:

# APPENDIX E
# Laboratory Analytical Reports and Chain-of-Custody Documents

NORTHERN
Analytical Laboratories, Inc.

602 South 25th Street
P O Box 30315
Billings, MT 59107
Telephone: (406) 254-7226
Fax: (406) 254-1389

**REPORT TO:** ATTN: JEFF RICE
MAXIM TECHNOLOGIES, INC.
P O BOX 30615
BILLINGS MT 59107

**DATE:** May 14, 2001
**JOB NUMBER:** 87-910
**SHEET:** 1 of 29
**INVOICE NO.:** 40295

**REPORT OF:** Water Analysis – Big Timber Landfill – 9731053.100

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**CASE NARRATIVE:**

On April 30, 2001, these water samples (laboratory numbers 2001040295-1 through 7) were received in our laboratory for analysis. Tests were conducted in accordance with EPA/600/4-79-020 *"Methods for Chemical Analysis of Water and Wastes"*; *"Standard Methods for the Examination of Water and Wastewater"*, 18th Edition and SW-846 *"Test Methods for Evaluating Solid Waste"*, 3rd Edition, updates I, II, IIA IIB, III.

The condition of the samples upon receipt at the laboratory is noted on the attached sample receipt checklist. Chain of custody documentation is enclosed.

The test results are shown on the following pages.

A < sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable.

Reviewed by

Kathleen A. Smit - Laboratory Manager

Attachments: Chain of Custody
Sample Receipt Checklist

caj

s a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of our clients and authorization for ublication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. Test results apply specifically o the samples tested only. The entire report shall not be reproduced, except in full, without the written approval of the laboratory. Samples will be isposed of after testing is completed unless other arrangements are agreed to in writing.

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-1 **Description:** BT-1S
**Date Received:** 04/30/2001
**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0430011015 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 04/30/2001 |
| Bromochloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| Bromoform | <1 | ug/l | 8260B | 04/30/2001 |
| Bromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 04/30/2001 |
| Chlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| Chloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Chloroform | <1 | ug/l | 8260B | 04/30/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 04/30/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 04/30/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-1 **Description:** BT-1S
**Date Received:** 04/30/2001
**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| Toluene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Trichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 04/30/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 04/30/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 04/30/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 04/30/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 04/30/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 04/30/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 04/30/2001 |
| Acetone | <20 | ug/l | 8260B | 04/30/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 04/30/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 95 | % [72-120] | 8260B | 04/30/2001 |
| Toluene-d8 (Surrogate) | 97 | % [88-112] | 8260B | 04/30/2001 |
| 4-Bromofluorobenzene (Surrogate) | 108 | % [84-120] | 8260B | 04/30/2001 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 50 | mg/l | 325.3 | 05/04/2001 |
| Sulfate as SO4 | 102 | mg/l | 9036 | 05/07/2001 |
| Chemical Oxygen Demand | 10 | mg/l | 410.2 | 05/10/2001 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNEMOD | 05/04/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-1 **Description:** BT-1S

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 494 | umhos/cm | 2510B | 05/04/2001 |
| pH | 9.1 | S.U. | 9040B | 04/30/2001 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/01/2001 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Copper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/02/2001 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 6020 | 05/02/2001 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 05/04/2001 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/01/2001 |
| Zinc as Zn (Dissolved) | 0.18 | mg/l | 6010B | 05/02/2001 |
| ICP/AA Batch#/Digest Date | NA | ----- | | |
| ICPMS Batch#/Digest Date | NA | ----- | | |
| Mercury Batch #/Digest Date | NA | ----- | | |
| Nitrate + Nitrite as N | 0.18 | mg/l | 353.2 | 05/11/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-2 **Description:** BT-2

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0430011016 | ---- | | |
| Benzene | <1 | ug/l | 8260B | 04/30/2001 |
| Bromochloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| Bromoform | <1 | ug/l | 8260B | 04/30/2001 |
| Bromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 04/30/2001 |
| Chlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| Chloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Chloroform | <1 | ug/l | 8260B | 04/30/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 04/30/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 04/30/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-2 **Description:** BT-2

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| Toluene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Trichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 04/30/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 04/30/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 04/30/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 04/30/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 04/30/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 04/30/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 04/30/2001 |
| Acetone | <20 | ug/l | 8260B | 04/30/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 04/30/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 106 | % [72-120] | 8260B | 04/30/2001 |
| Toluene-d8 (Surrogate) | 96 | % [88-112] | 8260B | 04/30/2001 |
| 4-Bromofluorobenzene (Surrogate) | 104 | % [84-120] | 8260B | 04/30/2001 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 33 | mg/l | 325.3 | 05/04/2001 |
| Sulfate as SO4 | 140 | mg/l | 9036 | 05/07/2001 |
| Chemical Oxygen Demand | <5 | mg/l | 410.2 | 05/10/2001 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNEMOD | 05/04/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-2 **Description:** BT-2
**Date Received:** 04/30/2001
**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 530 | umhos/cm | 9050A | 05/04/2001 |
| pH | 8.8 | S.U. | 9040B | 04/30/2001 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/01/2001 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Copper as Cu (Dissolved) | 0.003 | mg/l | 6020 | 05/01/2001 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/02/2001 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 6020 | 05/02/2001 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 05/04/2001 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/01/2001 |
| Zinc as Zn (Dissolved) | 0.04 | mg/l | 6010B | 05/02/2001 |
| ICP/AA Batch#/Digest Date | NA | ---- | | |
| ICPMS Batch#/Digest Date | NA | ---- | | |
| Mercury Batch #/Digest Date | NA | ---- | | |
| Nitrate + Nitrite as N | <0.05 | mg/l | 353.2 | 05/11/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-3 **Description:** BT-6

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0501011006 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/01/2001 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromoform | <1 | ug/l | 8260B | 05/01/2001 |
| Bromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/01/2001 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroform | <1 | ug/l | 8260B | 05/01/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 05/01/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-3 **Description:** BT-6
**Date Received:** 04/30/2001
**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Toluene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Trichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/01/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 05/01/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/01/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/01/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/01/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/01/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/01/2001 |
| Acetone | <20 | ug/l | 8260B | 05/01/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/01/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 94 | % [72-120] | 8260B | 05/01/2001 |
| Toluene-d8 (Surrogate) | 102 | % [88-112] | 8260B | 05/01/2001 |
| 4-Bromofluorobenzene (Surrogate) | 104 | % [84-120] | 8260B | 05/01/2001 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 60 | mg/l | 325.3 | 05/04/2001 |
| Sulfate as SO4 | 108 | mg/l | 9036 | 05/07/2001 |
| Chemical Oxygen Demand | 16 | mg/l | 410.2 | 05/10/2001 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNEMOD | 05/04/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-3 **Description:** BT-6

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 566 | umhos/cm | 9050A | 05/04/2001 |
| pH | 8.3 | S.U. | 9040B | 04/30/2001 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Cadmium as Cd (Dissolved) | 0.0002 | mg/l | 6020 | 05/01/2001 |
| Chromium as Cr (Dissolved) | 0.008 | mg/l | 6020 | 05/01/2001 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Copper as Cu (Dissolved) | 0.002 | mg/l | 6020 | 05/01/2001 |
| Iron as Fe (Dissolved) | 0.86 | mg/l | 6010B | 05/02/2001 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 6020 | 05/02/2001 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 05/04/2001 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/01/2001 |
| Zinc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 05/02/2001 |
| ICP/AA Batch#/Digest Date | NA | ----- | | |
| ICPMS Batch#/Digest Date | NA | ----- | | |
| Mercury Batch #/Digest Date | NA | ----- | | |
| Nitrate + Nitrite as N | 0.05 | mg/l | 353.2 | 05/11/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-4 **Description:** BT-7

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0501011007 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/01/2001 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromoform | <1 | ug/l | 8260B | 05/01/2001 |
| Bromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/01/2001 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroform | <1 | ug/l | 8260B | 05/01/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 05/01/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-4 **Description:** BT-7

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Toluene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Trichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/01/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 05/01/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/01/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/01/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/01/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/01/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/01/2001 |
| Acetone | <20 | ug/l | 8260B | 05/01/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/01/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 98 | % [72-120] | 8260B | 05/01/2001 |
| Toluene-d8 (Surrogate) | 101 | % [88-112] | 8260B | 05/01/2001 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % [84-120] | 8260B | 05/01/2001 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 179 | mg/l | 325.3 | 05/04/2001 |
| Sulfate as SO4 | 227 | mg/l | 9036 | 05/07/2001 |
| Chemical Oxygen Demand | 8 | mg/l | 410.2 | 05/10/2001 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNEMOD | 05/04/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-4 **Description:** BT-7
**Date Received:** 04/30/2001
**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 1270 | umhos/cm | 9050A | 05/04/2001 |
| pH | 7.6 | S.U. | 9040B | 04/30/2001 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/01/2001 |
| Chromium as Cr (Dissolved) | 0.003 | mg/l | 6020 | 05/01/2001 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Copper as Cu (Dissolved) | 0.003 | mg/l | 6020 | 05/01/2001 |
| Iron as Fe (Dissolved) | 0.06 | mg/l | 6010B | 05/02/2001 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 6020 | 05/02/2001 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Selenium as Se (Dissolved) | 0.005 | mg/l | 6020 | 05/01/2001 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 05/04/2001 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/01/2001 |
| Zinc as Zn (Dissolved) | 0.04 | mg/l | 6010B | 05/02/2001 |
| ICP/AA Batch#/Digest Date | NA | ----- | | |
| ICPMS Batch#/Digest Date | NA | ----- | | |
| Mercury Batch #/Digest Date | NA | ----- | | |
| Nitrate + Nitrite as N | <0.05 | mg/l | 353.2 | 05/11/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-5 **Description:** BT-101 dupli for BT-1S
**Date Received:** 04/30/2001
**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0501011008 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/01/2001 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromoform | <1 | ug/l | 8260B | 05/01/2001 |
| Bromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/01/2001 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroform | <1 | ug/l | 8260B | 05/01/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 05/01/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-5 **Description:** BT-101

dupli for BT-15

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Toluene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Trichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/01/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 05/01/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/01/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/01/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/01/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/01/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/01/2001 |
| Acetone | <20 | ug/l | 8260B | 05/01/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/01/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 94 | % [72-120] | 8260B | 05/01/2001 |
| Toluene-d8 (Surrogate) | 99 | % [88-112] | 8260B | 05/01/2001 |
| 4-Bromofluorobenzene (Surrogate) | 101 | % [84-120] | 8260B | 05/01/2001 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 48 | mg/l | 325.3 | 05/04/2001 |
| Sulfate as SO4 | 109 | mg/l | 9036 | 05/07/2001 |
| Chemical Oxygen Demand | <5 | mg/l | 410.2 | 05/10/2001 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNEMOD | 05/07/2001 |

X **Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-5 **Description:** BT-101 dupli BT-15

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 507 | umhos/cm | 9050A | 05/04/2001 |
| pH | 9.1 | S.U. | 9040B | 04/30/2001 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/01/2001 |
| Chromium as Cr (Dissolved) | 0.002 | mg/l | 6020 | 05/01/2001 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Copper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/02/2001 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 6020 | 05/02/2001 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 05/04/2001 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/01/2001 |
| Zinc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 05/02/2001 |
| ICP/AA Batch#/Digest Date | NA | ----- | | |
| ICPMS Batch#/Digest Date | NA | ----- | | |
| Mercury Batch #/Digest Date | NA | ----- | | |
| Nitrate + Nitrite as N | 0.18 / | mg/l | 353.2 | 05/11/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-6 **Description:** TRIP BLANK
**Date Received:** 04/30/2001
**Date Collected:** ----- **Collected by:** PREPARED BY LAB **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0501011009 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/01/2001 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromoform | <1 | ug/l | 8260B | 05/01/2001 |
| Bromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/01/2001 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroform | <1 | ug/l | 8260B | 05/01/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 05/01/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-6 **Description:** TRIP BLANK

**Date Received:** 04/30/2001

**Date Collected:** ----- **Collected by:** PREPARED BY LAB **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Toluene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Trichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/01/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 05/01/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/01/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/01/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/01/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/01/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/01/2001 |
| Acetone | <20 | ug/l | 8260B | 05/01/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/01/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 104 | % [72-120] | 8260B | 05/01/2001 |
| Toluene-d8 (Surrogate) | 96 | % [88-112] | 8260B | 05/01/2001 |
| 4-Bromofluorobenzene (Surrogate) | 98 | % [84-120] | 8260B | 05/01/2001 |

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**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-7 **Description:** FIELD BLANK
**Date Received:** 04/30/2001
**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0501011010 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/01/2001 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| Bromoform | <1 | ug/l | 8260B | 05/01/2001 |
| Bromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/01/2001 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Chloroform | 4 | ug/l | 8260B | 05/01/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 05/01/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/01/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/01/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 05/01/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-7 **Description:** FIELD BLANK
**Date Received:** 04/30/2001
**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Toluene | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/01/2001 |
| Trichloroethene | <1 | ug/l | 8260B | 05/01/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/01/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/01/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/01/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 05/01/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/01/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/01/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/01/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/01/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/01/2001 |
| Acetone | <20 | ug/l | 8260B | 05/01/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/01/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/01/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 102 | % [72-120] | 8260B | 05/01/2001 |
| Toluene-d8 (Surrogate) | 99 | % [88-112] | 8260B | 05/01/2001 |
| 4-Bromofluorobenzene (Surrogate) | 101 | % [84-120] | 8260B | 05/01/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-8 **Description:** MATRIX SPIKE OF 040295-1

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0430011022 | ---- | | |
| Benzene | 90 | % [80-104] | 8260B | 04/30/2001 |
| Bromochloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| Bromoform | <1 | ug/l | 8260B | 04/30/2001 |
| Bromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 04/30/2001 |
| Chlorobenzene | 91 | % [87-107] | 8260B | 04/30/2001 |
| Chloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Chloroform | <1 | ug/l | 8260B | 04/30/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethene | 67 | % [65-117] | 8260B | 04/30/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 04/30/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 04/30/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-8 **Description:** MATRIX SPIKE OF 040295-1

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| Toluene | 93 | % [85-105] | 8260B | 04/30/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Trichloroethene | 94 | % [83-107] | 8260B | 04/30/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 04/30/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 04/30/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 04/30/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 04/30/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 04/30/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 04/30/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 04/30/2001 |
| Acetone | <20 | ug/l | 8260B | 04/30/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 04/30/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 104 | % [72-120] | 8260B | 04/30/2001 |
| Toluene-d8 (Surrogate) | 101 | % [88-112] | 8260B | 04/30/2001 |
| 4-Bromofluorobenzene (Surrogate) | 102 | % [84-120] | 8260B | 04/30/2001 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 99 | % [84-113] | 325.3 | 05/04/2001 |
| Sulfate as SO4 | 104 | % [89-110] | 9036 | 05/07/2001 |
| Chemical Oxygen Demand | 107 | % [90-111] | 410.2 | 05/10/2001 |
| Cyanide as CN (Total) | 89 | % [61-115] | 4500CNEMOD | 05/07/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-8 **Description:** MATRIX SPIKE OF 040295-1

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | NA | —— | | |
| pH | NA | —— | —— | |
| Antimony as Sb (Dissolved) | 93 | % [70-130] | 6020 | 05/01/2001 |
| Arsenic as As (Dissolved) | 91 | % [70-130] | 6020 | 05/01/2001 |
| Barium as Ba (Dissolved) | 104 | % [70-130] | 6020 | 05/01/2001 |
| Beryllium as Be (Dissolved) | 86 | % [70-130] | 6020 | 05/01/2001 |
| Cadmium as Cd (Dissolved) | 92 | % [70-130] | 6020 | 05/01/2001 |
| Chromium as Cr (Dissolved) | 92 | % [70-130] | 6020 | 05/01/2001 |
| Cobalt as Co (Dissolved) | 90 | % [70-130] | 6020 | 05/01/2001 |
| Copper as Cu (Dissolved) | 89 | % [70-130] | 6020 | 05/01/2001 |
| Iron as Fe (Dissolved) | 102 | % [70-130] | 6010B | 05/02/2001 |
| Lead as Pb (Dissolved) | 92 | % [70-130] | 6020 | 05/01/2001 |
| Mercury as Hg (Dissolved) | 101 | % [70-130] | 6020 | 05/02/2001 |
| Nickel as Ni (Dissolved) | 88 | % [70-130] | 6020 | 05/01/2001 |
| Selenium as Se (Dissolved) | 88 | % [70-130] | 6020 | 05/01/2001 |
| Silver as Ag (Dissolved) | 86 | % [70-130] | 6020 | 05/04/2001 |
| Thallium as Tl (Dissolved) | 93 | % [70-130] | 6020 | 05/01/2001 |
| Vanadium as V (Dissolved) | 94 | % [70-130] | 6020 | 05/01/2001 |
| Zinc as Zn (Dissolved) | 103 | % [70-130] | 6010B | 05/02/2001 |
| ICP/AA Batch#/Digest Date | NA | —— | | |
| ICPMS Batch#/Digest Date | NA | —— | | |
| Mercury Batch #/Digest Date | NA | —— | | |
| Nitrate + Nitrite as N | 100 | % [89-113] | 353.2 | 05/11/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-9
**Description:** MATRIX SPIKE DUPLICATE OF 040295-1
**Date Received:** 04/30/2001
**Date Collected:** 04/27/2001
**Collected by:** MAX UNDERWOOD
**Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0430011023 | ---- | | |
| Benzene | 89 | % [80-104] | 8260B | 04/30/2001 |
| Bromochloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| Bromoform | <1 | ug/l | 8260B | 04/30/2001 |
| Bromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 04/30/2001 |
| Chlorobenzene | 93 | % [87-107] | 8260B | 04/30/2001 |
| Chloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Chloroform | <1 | ug/l | 8260B | 04/30/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethene | 68 | % [65-117] | 8260B | 04/30/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 04/30/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 04/30/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-9

**Description:** MATRIX SPIKE DUPLICATE OF 040295-1

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001

**Collected by:** MAX UNDERWOOD

**Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| Toluene | 89 | % [85-105] | 8260B | 04/30/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Trichloroethene | 90 | % [83-107] | 8260B | 04/30/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 04/30/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 04/30/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 04/30/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 04/30/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 04/30/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 04/30/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 04/30/2001 |
| Acetone | <20 | ug/l | 8260B | 04/30/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 04/30/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 99 | % [72-120] | 8260B | 04/30/2001 |
| Toluene-d8 (Surrogate) | 96 | % [88-112] | 8260B | 04/30/2001 |
| 4-Bromofluorobenzene (Surrogate) | 104 | % [84-120] | 8260B | 04/30/2001 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 104 | % [84-113 | 325.3 | 05/04/2001 |
| Sulfate as SO4 | 94 | % [89-110] | 9036 | 05/07/2001 |
| Chemical Oxygen Demand | 102 | % [90-111] | 410.2 | 05/10/2001 |
| Cyanide as CN (Total) | 82 | % [61-115] | 4500CNEMOD | 05/07/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-9 **Description:** MATRIX SPIKE DUPLICATE OF 040295-1

**Date Received:** 04/30/2001

**Date Collected:** 04/27/2001 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | NA | ---- | | |
| pH | NA | ---- | ---- | |
| Antimony as Sb (Dissolved) | 91 | % [70-130] | 6020 | 05/01/2001 |
| Arsenic as As (Dissolved) | 88 | % [70-130] | 6020 | 05/01/2001 |
| Barium as Ba (Dissolved) | 108 | % [70-130] | 6020 | 05/01/2001 |
| Beryllium as Be (Dissolved) | 84 | % [70-130] | 6020 | 05/01/2001 |
| Cadmium as Cd (Dissolved) | 89 | % [70-130] | 6020 | 05/01/2001 |
| Chromium as Cr (Dissolved) | 89 | % [70-130] | 6020 | 05/01/2001 |
| Cobalt as Co (Dissolved) | 89 | % [70-130] | 6020 | 05/01/2001 |
| Copper as Cu (Dissolved) | 88 | % [70-130] | 6020 | 05/01/2001 |
| Iron as Fe (Dissolved) | 103 | % [70-130] | 6010B | 05/02/2001 |
| Lead as Pb (Dissolved) | 90 | % [70-130] | 6020 | 05/01/2001 |
| Mercury as Hg (Dissolved) | 98 | % [70-130] | 6020 | 05/02/2001 |
| Nickel as Ni (Dissolved) | 86 | % [70-130] | 6020 | 05/01/2001 |
| Selenium as Se (Dissolved) | 84 | % [70-130] | 6020 | 05/01/2001 |
| Silver as Ag (Dissolved) | 89 | % [70-130] | 6020 | 05/04/2001 |
| Thallium as Tl (Dissolved) | 91 | % [70-130] | 6020 | 05/01/2001 |
| Vanadium as V (Dissolved) | 92 | % [70-130] | 6020 | 05/01/2001 |
| Zinc as Zn (Dissolved) | 104 | % [70-130] | 6010B | 05/02/2001 |
| ICP/AA Batch#/Digest Date | NA | ---- | | |
| ICPMS Batch#/Digest Date | NA | ---- | | |
| Mercury Batch #/Digest Date | NA | ---- | | |
| Nitrate + Nitrite as N | 100 | % [89-113] | 353.2 | 05/11/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-10 **Description:** METHOD BLANK
**Date Received:** 04/30/2001
**Date Collected:** ----- **Collected by:** PREPARED BY LAB **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0430011004 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 04/30/2001 |
| Bromochloromethane | <1 | ug/l | 8260b | 04/30/2001 |
| Bromodichloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| Bromoform | <1 | ug/l | 8260B | 04/30/2001 |
| Bromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 04/30/2001 |
| Chlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| Chloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Chloroform | <1 | ug/l | 8260B | 04/30/2001 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromochloromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dibromomethane | <1 | ug/l | 8260B | 04/30/2001 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 04/30/2001 |
| Ethylbenzene | <1 | ug/l | 8260B | 04/30/2001 |
| Methylene chloride | <5 | ug/l | 8260B | 04/30/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-10 **Description:** METHOD BLANK

**Date Received:** 04/30/2001

**Date Collected:** ----- **Collected by:** PREPARED BY LAB **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Tetrachloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| Toluene | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 04/30/2001 |
| Trichloroethene | <1 | ug/l | 8260B | 04/30/2001 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 04/30/2001 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 04/30/2001 |
| Vinyl chloride | <1 | ug/l | 8260B | 04/30/2001 |
| Total Xylenes | <2 | ug/l | 8260B | 04/30/2001 |
| Acrylonitrile | <10 | ug/l | 8260B | 04/30/2001 |
| Carbon disulfide | <5 | ug/l | 8260B | 04/30/2001 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 04/30/2001 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 04/30/2001 |
| Vinyl acetate | <10 | ug/l | 8260B | 04/30/2001 |
| Acetone | <20 | ug/l | 8260B | 04/30/2001 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 04/30/2001 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 04/30/2001 |
| 1,2-Dichloroethane-d4 (Surrogate) | 92 | % [72-120] | 8260B | 04/30/2001 |
| Toluene-d8 (Surrogate) | 100 | % [88-112] | 8260B | 04/30/2001 |
| 4-Bromofluorobenzene (Surrogate) | 105 | % [84-120] | 8260B | 04/30/2001 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | <4 | mg/l | 325.3 | 05/04/2001 |
| Sulfate as SO4 | <5 | mg/l | 9036 | 05/07/2001 |
| Chemical Oxygen Demand | <5 | mg/l | 410.2 | 05/10/2001 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNEMOD | 05/07/2001 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2001040295-10 **Description:** METHOD BLANK

**Date Received:** 04/30/2001

**Date Collected:** ----- **Collected by:** PREPARED BY LAB **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | <10 | umhos/cm | 9050A | 05/04/2001 |
| pH | NA | ----- | ----- | |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/01/2001 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Copper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 05/01/2001 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/02/2001 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/01/2001 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 6020 | 05/02/2001 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/01/2001 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 05/01/2001 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 05/04/2001 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/01/2001 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/01/2001 |
| Zinc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 05/02/2001 |
| ICP/AA Batch#/Digest Date | NA | ----- | 8260B | |
| ICPMS Batch#/Digest Date | NA | ----- | 8260B | |
| Mercury Batch #/Digest Date | NA | ----- | 8260B | |
| Nitrate + Nitrite as N | <0.05 | mg/l | 353.2 | 05/11/2001 |

BIG TIMBER LANDFILL
Project or Site Name

9731053.100
Project Number

MAX UNDERWOOD
Sampler Name (Printed)

JEFF RICE
Contact Name

# CHAIN OF CUSTODY RECORD

**NORTHERN**
**Analytical Laboratories, Inc.**

602 South 25th Street
Billings, Montana 59101
Ph: 406-254-7226 • Fax: 406-254-1389

MAXIM
Report to (Firm or Agency)

618 South 25th ST.
Address

BILLINGS MT 59101
City State Zip

406.248.9161 / 406.248.9282
Phone Fax

| DATE COLLECTED | TIME COLLECTED | SAMPLE LOCATION OR DESCRIPTION | COMP OR GRAB | SAMPLE MATRIX | NO. OF CONTAINERS | ANALYSIS REQUIRED |  |  |  |  |  |  | NOTES | LAB NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  | TABLE 1 | VOCs ONLY |  |  |  |  |  |  | 2001 040295 |
| 4-27-01 | 1420 | BT-1S | GRAB | H2O | 7 | X |  |  |  |  |  |  |  | 1 |
| ↓ | 1300 | BT-2 | ↓ | ↓ | 7 | X |  |  |  |  |  |  |  | 2 |
|  | 1545 | BT-6 |  |  | 7 | X |  |  |  |  |  |  |  | 3 |
|  | 1515 | BT-7 |  |  | 7 | X |  |  |  |  |  |  |  | 4 |
|  | 1400 | BT-101 |  |  | 7 | X |  |  |  |  |  |  |  | 5 |
| 4-23-01 | 0800 | TRIP BLANK | ↓ | ↓ | 2 |  | X |  |  |  |  |  | HOLD unless Field | 6. |
| 4-27-01 | 1555 | FIELD BLANK | ↓ | ↓ | 3 |  | X |  |  |  |  |  | Blank fails - | 7 |
|  |  |  |  |  |  |  |  |  |  |  |  |  | MS #1 | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  | MSD #1 | 9 |
|  |  |  |  |  |  |  |  |  |  |  |  |  | MB | 10 |

| Relinquished by: | Date | Time | Received by: |
|---|---|---|---|
| Max Underwood | 4/30/01 | 0925 | M Walter |
| Relinquished by: | Date | Time | Received by: |
| Relinquished by: | Date | Time | Received by: |

NORTHERN
Analytical Laboratories, Inc.

# SAMPLE RECEIPT CHECKLIST

Dear Valued Client: This checklist documents the condition of your sample(s) as it (they) arrived at our lab. Please review it and familiarize yourself with its contents. Should you have any questions or comments, please contact us. Thank you for your use of our services.

Client Name M. Blgo

Project Big Timber L.F.

Laboratory Number(s) 2001 840

Checklist Completed by MW 4/30/01
Initials / Date

Date/Time Received 4/30/01 0925
Date / Time

Received by MW

Carrier Name Client

Sample Type $H_2O$

| | YES | NO |
|---|---|---|
| 1. Shipping container in good condition? | ✓ | |
| 2. Custody seals present on shipping container?<br>Condition: Intact ____ Broken ____ | | ✓ |
| 3. Chain of custody present? | ✓ | |
| 4. Chain of custody signed when relinquished and received? | ✓ | |
| 5. Chain of custody agrees with sample labels? | ✓ | |
| 6. Custody seals on sample bottles?<br>Condition: Intact ____ Broken ____ | | ✓ |
| 7. Samples in proper container/bottle?* | ✓ | |
| 8. Sample containers intact?* | ✓ | |
| 9. Sufficient sample volume for indicated test?* | ✓ | |
| 10. [✓ Ice]/Frozen Blue Ice present in shipping container? (circle one) | ✓ | |
| container temperature 1. 4.0 C 2. ____ 3. ____<br>* (if <0 or>10) | | |
| 11. All samples rec'd within holding time?* | ✓ | |
| 12. VOA vials have zero headspace?<br>* (if contains >5mm headspace) | ✓ | |
| 13. Trip Blank received? | ✓ | |

14. pH check performed by: MW

| | YES | NO |
|---|---|---|
| 15. Metals bottle(s) pH <2? | ✓ | |
| 16. Nutrient bottle(s) pH <2? | ✓ | |
| 17. Cyanide bottle(s) pH >12? | ✓ | |
| 18. Sulfide bottle(s) pH >9? | | NA |
| 19. TOC bottle(s) pH <2? | | |
| 20. Phenolics bottle(s) pH <2? | | |
| 21. Oil & grease bottle(s) pH <2? (checked by analyst) | | |
| 22. DRO/418.1 bottle(s) pH <2? (checked by analyst) | | |
| 23. Volatiles (VOA) pH <2? (VOA pH checked by analyst) | | |
| 24. Herbicides (515) pH <2? (checked by analyst) | | |
| 25. Semivolatiles (525) pH <2? (checked by analyst) | | |
| 26. Client contacted? | | |
| 27. Person contacted | | |
| 28. Date contacted | | |

**NOTES: Samples may be affected when not transported at the temperature recommended by the EPA for the test you've selected. Please contact the lab if you have concerns about the temperature of your samples.**

*** Critical item - if marked "NO" contact lab manager.**

**COMMENTS:** ____________________

# APPENDIX F
## Summary of Laboratory Data

# SUMMARY OF FIELD AND LABORATORY RESULTS
# BIG TIMBER LANDFILL, BIG TIMBER, MONTANA
# WELL BT-1S

| Sample Date | 10/5/94 | 4/28/95 | 1/16/96 | 10/8/96 | 4/29/97 | 12/10/97 | 11/19/98 | 5/6/99 | 10/20/99 | 4/25/00 | 10/18/00 | 4/27/01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature, °C | 9.8 | 9.5 | 10.2 | 9.3 | 55.7 | 9.5 | 10.1 | 11 | 10.9 | 11.9 | 10.6 | 10.9 |
| pH, S.U. | 8.0 | 7.5 | 7.7 | 7.4 | 7.9 | 6.8 | 7.8 | 7.9 | 7.7 | 7.5 | 8.6 | 9.2 |
| Electrical Conductivity, umhos/cm | 1225 | 1233 | 1190 | 1250 | 1570 | 1150 | 1177 | 877 | 1246 | 890 | 3974 | 540 |
| ***Parameter*** | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results |
| Chloride as Cl, mg/l | 116 | 110 | 131 | 143 | 137 | 139 | 136 | 130 | 130 | 129 | 51 | 50 |
| Sulfate as SO4, mg/l | 318 | 361 | 334 | 434 | 412 | 418 | 393 | 352 | 365 | 334 | 125 | 102 |
| Chemical Oxygen Demand, mg/l | 8 | 27 | 12 | 17 | 45 | 9 | 15 | 7 | 14 | 10 | <5 | 10 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1410 | 1400 | 1520 | 1680 | 1700 | 1680 | 1730 | 1730 | 1600 | 1420 | 538 | 494 |
| pH, S.U. | 7.8 | 7.7 | 7.8 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.8 | 7.6 | 8.6 | 9.1 |
| Antimony as Sb (Dissolved), mg/l | 0.008 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic as As (Dissilved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | 0.05 | <0.02 | <0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | <0.02 | <0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium as Cr (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.004 | 0.003 | 0.004 | 0.004 | 0.012 | <0.001 | <0.001 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.006 | 0.004 | 0.003 | <0.001 | 0.001 | 0.001 | 0.002 | <0.001 | 0.001 | 0.002 | <0.001 | <0.001 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.33 | <0.05 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | 0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | 0.009 | <0.005 | <0.005 | <0.005 | <0.005 | 0.018 | 0.020 | 0.014 | 0.039 | <0.005 | <0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0005 | <0.0005 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.18 |

n\envir\Btlf\Summary of lab data\BT-1S

# SUMMARY OF FIELD AND LABORATORY RESULTS
# BIG TIMBER LANDFILL, BIG TIMBER, MONTANA
## WELL BT-101

| **Sample Date** | **1/16/96** | **10/8/96** | **12/10/97** | **11/19/98** | **5/6/99** | **10/20/99** | **4/25/00** | **10/18/00** | **4/27/01** |
|---|---|---|---|---|---|---|---|---|---|
| Temperature, °C | 10.2 | 9.3 | 9.5 | 10.1 | 11 | 10.9 | 11.9 | 10.6 | 10.9 |
| pH, S.U. | 7.7 | 7.4 | 6.8 | 7.8 | 7.9 | 7.7 | 7.5 | 8.6 | 9.2 |
| SC, umhos/cm | 1190 | 1250 | 1150 | 1177 | 877 | 1246 | 890 | 3974 | 540 |
| ***Parameter*** | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results |
| Chloride as Cl, mg/l | 131 | 138 | 137 | 134 | 140 | 126 | 129 | 61 | 48 |
| Sulfate as SO4, mg/l | 327 | 431 | 416 | 397 | 360 | 370 | 337 | 142 | 109 |
| Chemical Oxygen Demand, mg/l | 11 | 18 | 14 | 16 | 7 | 10 | 12 | 7 | <5 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1510 | 1710 | 1690 | 1730 | 1730 | 1590 | 1410 | 583 | 507 |
| pH, S.U. | 7.8 | 7.7 | 7.7 | 7.7 | 7.8 | 7.8 | 7.6 | 8.7 | 9.1 |
| Antimony as Sb (Dissolved), mg/l | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic as As (Dissilved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | <0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | <0.02 | <0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium as Cr (Dissolved), mg/l | <0.002 | <0.002 | 0.006 | 0.003 | 0.004 | 0.005 | 0.017 | <0.001 | 0.002 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | <0.001 | 0.001 | 0.002 | 0.001 | 0.002 | 0.013 | <0.001 | <0.001 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | 0.018 | 0.018 | 0.018 | 0.041 | <0.005 | <0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.001 | <0.0005 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |

n\typing\envir\9731053\Summary of lab data\BT-101S

# SUMMARY OF FIELD AND LABORATORY RESULTS
# BIG TIMBER LANDFILL, BIG TIMBER, MONTANA
# WELL BT-2

| **Sample Date** | **10/4/94** | **4/28/95** | **1/16/96** | **10/8/96** | **4/29/97** | **12/10/97** | **11/19/98** | **5/6/99** | **10/20/99** | **4/25/00** | **10/18/00** | **4/27/01** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature, °C | 9.7 | 9.9 | 10.0 | 9.4 | 51.4 | 9.5 | 10.3 | 11 | 11 | 12.2 | 10.4 | 11 |
| pH, S.U. | 9.1 | 8.3 | 8.7 | 8.1 | 8.2 | 7.6 | 9.0 | 9.0 | 8.8 | 8.5 | 7.5 | 8.8 |
| Electrical Conductivity, umhos/cm | 522 | 466 | 446 | 428 | 559 | 360 | 385 | 293 | 405 | 317 | 349 | 580 |

| ***Parameter*** | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride as Cl, mg/l | 39 | 32 | 28 | 30 | 28 | 31 | 31 | 26 | 26 | 27 | 24 | 33 |
| Sulfate as SO4, mg/l | 174 | 161 | 146 | 156 | 164 | 147 | 153 | 140 | 152 | 150 | 142 | 140 |
| Chemical Oxygen Demand, mg/l | 37 | 13 | 46 | 10 | 10 | 8 | 17 | 6 | 36 | 19 | 14 | <5 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 566 | 450 | 511 | 533 | 549 | 534 | 535 | 539 | 478 | 459 | 471 | 530 |
| pH, S.U. | 8.2 | 8.0 | 8.1 | 8.7 | 8.6 | 8.6 | 8.7 | 8.6 | 8.7 | 8.6 | 8.5 | 8.8 |
| Antimony as Sb (Dissolved), mg/l | 0.009 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic as As (Dissilved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | 0.03 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium as Cr (Dissolved), mg/l | <0.002 | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | 0.010 | <0.001 | <0.001 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.018 | <0.001 | 0.003 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | 0.11 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0016 | <0.0005 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | 0.04 |

n\envir\Btlf\Summary of lab data\BT-2

# SUMMARY OF FIELD AND LABORATORY RESULTS
## BIG TIMBER LANDFILL, BIG TIMBER, MONTANA
## WELL BT-3

| **Sample Date** | **10/4/94** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Temperature, °C | 10.4 | | | | | | | | | |
| pH, S.U. | 7.7 | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 1252 | | | | | | | | | |

| ***Parameter*** | Lab Results | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Chloride as Cl, mg/l | 93 | | | | | | | | | |
| Sulfate as SO4, mg/l | 384 | | | | | | | | | |
| Chemical Oxygen Demand, mg/l | 5 | | | | | | | | | |
| Cyanide as CN (Total), mg/l | <0.005 | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 1150 | | | | | | | | | |
| pH, S.U. | 8.1 | | | | | | | | | |
| Antimony as Sb (Dissolved), mg/l | 0.006 | | | | | | | | | |
| Arsenic as As (Dissilved), mg/l | <0.005 | | | | | | | | | |
| Barium as Ba (Dissolved), mg/l | 0.08 | | | | | | | | | |
| Beryllium as Be (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Cadmium as Cd (Dissolved), mg/l | <0.0006 | | | | | | | | | |
| Chromium as Cr (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Cobalt as Co (Dissolved), mg/l | <0.005 | | | | | | | | | |
| Copper as Cu (Dissolved), mg/l | 0.007 | | | | | | | | | |
| Iron as Fe (Dissolved), mg/l | <0.05 | | | | | | | | | |
| Lead as Pb (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | | | | | | | | | |
| Nickel as Ni (Dissolved), mg/l | <0.05 | | | | | | | | | |
| Selenium as Se (Dissolved), mg/l | <0.005 | | | | | | | | | |
| Silver as Ag (Dissolved), mg/l | <0.0002 | | | | | | | | | |
| Thallium as Tl (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Vanadium as V (Dissolved), mg/l | <0.05 | | | | | | | | | |
| Zinc as Zn (Dissolved), mg/l | <0.02 | | | | | | | | | |

# SUMMARY OF FIELD AND LABORATORY RESULTS
# BIG TIMBER LANDFILL, BIG TIMBER, MONTANA
# WELL BT-4

| **Sample Date** | **10/4/94** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Temperature, °C | 9.6 | | | | | | | | | |
| pH, S.U. | 7.9 | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 928 | | | | | | | | | |
| ***Parameter*** | Lab Results | | | | | | | | | |
| Chloride as Cl, mg/l | 71 | | | | | | | | | |
| Sulfate as SO4, mg/l | 190 | | | | | | | | | |
| Chemical Oxygen Demand, mg/l | 6 | | | | | | | | | |
| Cyanide as CN (Total), mg/l | <0.005 | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 1040 | | | | | | | | | |
| pH, S.U. | 7.7 | | | | | | | | | |
| Antimony as Sb (Dissolved), mg/l | 0.006 | | | | | | | | | |
| Arsenic as As (Dissilved), mg/l | <0.005 | | | | | | | | | |
| Barium as Ba (Dissolved), mg/l | 0.04 | | | | | | | | | |
| Beryllium as Be (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | | | | | | | | | |
| Chromium as Cr (Dissolved), mg/l | 0.003 | | | | | | | | | |
| Cobalt as Co (Dissolved), mg/l | <0.005 | | | | | | | | | |
| Copper as Cu (Dissolved), mg/l | 0.002 | | | | | | | | | |
| Iron as Fe (Dissolved), mg/l | <0.05 | | | | | | | | | |
| Lead as Pb (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | | | | | | | | | |
| Nickel as Ni (Dissolved), mg/l | <0.05 | | | | | | | | | |
| Selenium as Se (Dissolved), mg/l | <0.005 | | | | | | | | | |
| Silver as Ag (Dissolved), mg/l | <0.0002 | | | | | | | | | |
| Thallium as Tl (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Vanadium as V (Dissolved), mg/l | <0.05 | | | | | | | | | |
| Zinc as Zn (Dissolved), mg/l | <0.02 | | | | | | | | | |

# SUMMARY OF FIELD AND LABORATORY RESULTS
# BIG TIMBER LANDFILL, BIG TIMBER, MONTANA
## WELL BT-5

| **Sample Date** | **10/4/94** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Temperature, °C | 9.4 | | | | | | | | | |
| pH, S.U. | 8.2 | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 945 | | | | | | | | | |

| ***Parameter*** | Lab Results | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Chloride as Cl, mg/l | 131 | | | | | | | | | |
| Sulfate as SO4, mg/l | 172 | | | | | | | | | |
| Chemical Oxygen Demand, mg/l | 6 | | | | | | | | | |
| Cyanide as CN (Total), mg/l | <0.005 | | | | | | | | | |
| Electrical Conductivity, umhos/cm | 1050 | | | | | | | | | |
| pH, S.U. | 7.8 | | | | | | | | | |
| Antimony as Sb (Dissolved), mg/l | 0.006 | | | | | | | | | |
| Arsenic as As (Dissilved), mg/l | <0.005 | | | | | | | | | |
| Barium as Ba (Dissolved), mg/l | 0.04 | | | | | | | | | |
| Beryllium as Be (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | | | | | | | | | |
| Chromium as Cr (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Cobalt as Co (Dissolved), mg/l | <0.005 | | | | | | | | | |
| Copper as Cu (Dissolved), mg/l | 0.003 | | | | | | | | | |
| Iron as Fe (Dissolved), mg/l | <0.05 | | | | | | | | | |
| Lead as Pb (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | | | | | | | | | |
| Nickel as Ni (Dissolved), mg/l | <0.05 | | | | | | | | | |
| Selenium as Se (Dissolved), mg/l | <0.005 | | | | | | | | | |
| Silver as Ag (Dissolved), mg/l | <0.0002 | | | | | | | | | |
| Thallium as Tl (Dissolved), mg/l | <0.002 | | | | | | | | | |
| Vanadium as V (Dissolved), mg/l | <0.05 | | | | | | | | | |
| Zinc as Zn (Dissolved), mg/l | <0.02 | | | | | | | | | |

# SUMMARY OF FIELD AND LABORATORY RESULTS
# BIG TIMBER LANDFILL, BIG TIMBER, MONTANA
# WELL BT-6

| Sample Date | 10/5/94 | 4/28/95 | 1/16/96 | 10/8/96 | 4/29/97 | 12/10/97 | 11/19/98 | 5/6/99 | 10/20/99 | 4/25/00 | 10/18/00 | 4/27/01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature, °C | 11.2 | 9.3 | 10.1 | 9.9 | 59 | NA | 9.9 | NA | 11.3 | 11.9 | 10.3 | 12.9 |
| pH, S.U. | 9.0 | 8.2 | 8.5 | 7.9 | 8.7 | NA | 9.2 | NA | 8.2 | 7.3 | 7.6 | 8.2 |
| Electrical Conductivity, umhos/cm | 950 | 746 | 568 | 642 | 638 | NA | 403 | NA | 435 | 342 | 406 | 638 |
| ***Parameter*** | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results |
| Chloride as Cl, mg/l | 153 | 74 | 63 | 74 | 58 | 64 | 56 | 53 | 51 | 56 | 57 | 60 |
| Sulfate as SO4, mg/l | 267 | 258 | 174 | 306 | 137 | 117 | 108 | 93 | 98 | 98 | 114 | 108 |
| Chemical Oxygen Demand, mg/l | 7 | 3 | 43 | 24 | 204 | 18 | 9 | <5 | 30 | 21 | 40 | 16 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1460 | 789 | 586 | 914 | 599 | 621 | 568 | 556 | 502 | 472 | 548 | 566 |
| pH, S.U. | 7.5 | 7.7 | 8.2 | 8.6 | 8.6 | 8.2 | 8.5 | 8.6 | 8.5 | 8.6 | 8,5 | 8.3 |
| Antimony as Sb (Dissolved), mg/l | 0.008 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | 0.005 | <0.003 | <0.003 |
| Arsenic as As (Dissilved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | 0.06 | 0.02 | <0.02 | 0.04 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0002 |
| Chromium as Cr (Dissolved), mg/l | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.001 | 0.003 | <0.001 | 0.008 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | 0.002 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001 | 0.003 | 0.004 | <0.001 | 0.002 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | 0.08 | <0.05 | 0.09 | <0.05 | <0.05 | <0.05 | 0.05 | <0.05 | <0.05 | 0.86 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.001 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.05 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.011 | <0.005 | <0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0024 | <0.0005 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.06 | <0.02 | <0.02 |

n\envir\Btlf\Summary of lab data\BT-6

# SUMMARY OF FIELD AND LABORATORY RESULTS
# BIG TIMBER LANDFILL, BIG TIMBER, MONTANA
# WELL BT-7

| Sample Date | 1/16/96 | 10/8/96 | 4/29/97 | 12/10/97 | 11/19/98 | 5/6/99 | 10/20/99 | 4/25/00 | 10/18/00 | 4/27/01 |
|---|---|---|---|---|---|---|---|---|---|---|
| Temperature, °C | 10 | 10.9 | 54.2 | 9 | 10.3 | 11.6 | 11.5 | 12.6 | 11.1 | 12 |
| pH, S.U. | 7.2 | 7.4 | 7.4 | NA | 7.8 | 7.8 | 7.7 | 7.5 | 7.6 | 7.7 |
| Electrical Conductivity, umhos/cm | 1053 | 948 | 1210 | 875 | 886 | 693 | 941 | 755 | 941 | 1310 |
| ***Parameter*** | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results | Lab Results |
| Chloride as Cl, mg/l | 175 | 170 | 177 | 170 | 155 | 160 | 150 | 172 | 169 | 179 |
| Sulfate as SO4, mg/l | 218 | 237 | 226 | 219 | 226 | 220 | 227 | 231 | 225 | 227 |
| Chemical Oxygen Demand, mg/l | 20 | 29 | 57 | 21 | 24 | 24 | 21 | 10 | 12 | 8 |
| Cyanide as CN (Total), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Electrical Conductivity, umhos/cm | 1340 | 1250 | 1300 | 1260 | 1290 | 1320 | 1240 | 1170 | 1220 | 1270 |
| pH, S.U. | 7.3 | 7.6 | 7.7 | 7.7 | 7.7 | 7.8 | 7.8 | 7.6 | 7.7 | 7.6 |
| Antimony as Sb (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Arsenic as As (Dissilved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Barium as Ba (Dissolved), mg/l | 0.07 | 0.05 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | <0.02 | <0.02 | <0.02 |
| Beryllium as Be (Dissolved), mg/l | <0.002 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Cadmium as Cd (Dissolved), mg/l | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium as Cr (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | 0.002 | <0.001 | <0.001 | <0.001 | 0.005 | <0.001 | 0.003 |
| Cobalt as Co (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Copper as Cu (Dissolved), mg/l | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.036 | <0.001 | 0.003 |
| Iron as Fe (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.06 |
| Lead as Pb (Dissolved), mg/l | <0.002 | <0.001 | <0.001 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Mercury as Hg (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Nickel as Ni (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Selenium as Se (Dissolved), mg/l | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.012 | <0.005 | 0.005 |
| Silver as Ag (Dissolved), mg/l | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0033 | <0.0005 | <0.0005 |
| Thallium as Tl (Dissolved), mg/l | <0.002 | <0.002 | <0.002 | <0.003 | <0.003 | <0.003 | <0.003 | <0.002 | <0.002 | <0.002 |
| Vanadium as V (Dissolved), mg/l | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Zinc as Zn (Dissolved), mg/l | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.04 |

n\envir\Btlf\Summary of lab data\BT-7

# APPENDIX G
## Results of Statistical Analysis

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # ARSENIC (ARS) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\ARS.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\ARS.MTW
MTB > #
MTB > DESCRIBE 'ARS' ;
SUBC> BY 'WELL'.

              WELL       N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
ARS              1      27   2.5000   2.5000   2.5000   0.0000   0.0000
                 6      12    3.083    2.500    2.850    1.362    0.393
                 7      10   2.5000   2.5000   2.5000   0.0000   0.0000

              WELL     MIN      MAX       Q1       Q3
ARS              1  2.5000   2.5000   2.5000   2.5000
                 6   2.500    6.000    2.500    2.500
                 7  2.5000   2.5000   2.5000   2.5000

MTB > BOXPLOT 'ARS' ;
SUBC> BY 'WELL'.

WELL

              -
1             +
              -

              -
6             +                                                  O
              -

              -
7             +
              -
          --------+---------+---------+---------+---------+---------ARS
                2.80      3.50      4.20      4.90      5.60

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # ARSENIC (ARS) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # COMPARISON OF DOWNGRADIENT COUNT TO POISSON PREDICTION LIMIT
   N       =     27
   SUM     =      67.200
   N       =     22

 ROW     N  COUNT     K   CONF     LIMIT

   1    27   67.2    22   0.95   72.9845

MTB > # DOWNGRADIENT POISSON COUNT
MTB > SUM 'DG'
   SUM     =      62.000
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # SILVER (AG) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\AG.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\AG.MTW
MTB > #
MTB > DESCRIBE 'AG' ;
SUBC> BY 'WELL'.

             WELL       N      MEAN    MEDIAN    TRMEAN     STDEV    SEMEAN
AG              1      27    0.1833    0.1000    0.1300    0.2892    0.0557
                6      12     0.292     0.100     0.100     0.664     0.192
                7      10     0.450     0.100     0.138     1.003     0.317

             WELL     MIN       MAX        Q1        Q3
AG              1  0.1000    1.6000    0.1000    0.1000
                6   0.100     2.400     0.100     0.100
                7   0.100     3.300     0.100     0.250

MTB > BOXPLOT 'AG' ;
SUBC> BY 'WELL'.

WELL

            -
1           + O                       O
            -

            -
6           +                                      O
            -

            ---
7           + I                                                   O
            ---
           +---------+---------+---------+---------+---------+------AG
        0.00      0.60      1.20      1.80      2.40      3.00

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # ARSENIC (ARS) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # COMPARISON OF DOWNGRADIENT COUNT TO POISSON PREDICTION LIMIT
   N       =      27
   SUM     =      4.9500
   N       =      22

 ROW     N  COUNT     K   CONF     LIMIT

   1    27   4.95    22   0.95   9.98287

MTB > # DOWNGRADIENT POISSON COUNT
MTB > SUM 'DG'
   SUM     =      8.3000
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # BARIUM (BA) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\BA.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\BA.MTW
MTB > #
MTB > DESCRIBE 'BA' ;
SUBC> BY 'WELL'.

             WELL         N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
BA              1        27  0.02778  0.02000  0.02600  0.01311  0.00252
                6        12  0.02500  0.02000  0.02200  0.01243  0.00359
                7        10  0.03400  0.03000  0.03125  0.01578  0.00499

             WELL       MIN      MAX       Q1       Q3
BA              1  0.02000  0.08000  0.02000  0.03000
                6  0.02000  0.06000  0.02000  0.02000
                7  0.02000  0.07000  0.02000  0.04250

MTB > BOXPLOT 'BA' ;
SUBC> BY 'WELL'.

WELL

             ---------
1            +       I--------        *                        O
             ---------

             -
6            +               O                O
             -

             -----------------
7            I       +       I-------------------------
             -----------------
          ------+---------+---------+---------+---------+---------+BA
            0.024     0.036     0.048     0.060     0.072     0.084

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # BARIUM (BA) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # CONTINGENCY TABLE OF NON-DETECTS (ND) VS. DETECTS (D)
MTB > #
MTB > CHISQUARE '1' '6' '7'.

 Expected counts are printed below observed counts

             1        6        7    Total
    1       14        8        3       25
         13.78     6.12     5.10

    2       13        4        7       24
         13.22     5.88     4.90

Total       27       12       10       49

ChiSq =  0.004 +  0.576 +  0.866 +
         0.004 +  0.600 +  0.902 = 2.951
df = 2
1 cells with expected counts less than 5.0
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # CADMIUM (CD) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\CD.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\CD.MTW
MTB > #
MTB > DESCRIBE 'CD' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
CD              1       27   0.1685   0.2500   0.1680   0.1011   0.0195
                6       12   0.1625   0.2250   0.1650   0.1003   0.0289
                7       10   0.1300   0.0500   0.1250   0.1033   0.0327

             WELL      MIN      MAX       Q1       Q3
CD              1   0.0500   0.3000   0.0500   0.2500
                6   0.0500   0.2500   0.0500   0.2500
                7   0.0500   0.2500   0.0500   0.2500

MTB > BOXPLOT 'CD' ;
SUBC> BY 'WELL'.

WELL

               ------------------------------------------
1              I                                        +----------
               ------------------------------------------

               ------------------------------------------
6              I                                   +    I
               ------------------------------------------

               ------------------------------------------
7              +                                        I
               ------------------------------------------
           ----+---------+---------+---------+---------+---------+--CD
           0.050     0.100     0.150     0.200     0.250     0.300
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # CADMIUM (CD) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # COMPARISON OF DOWNGRADIENT COUNT TO POISSON PREDICTION LIMIT
   N       =      27
   SUM     =        4.5500
   N       =      22

 ROW      N  COUNT     K   CONF    LIMIT

   1     27  4.55     22   0.95   9.4728

MTB > # DOWNGRADIENT POISSON COUNT
MTB > SUM 'DG'
   SUM     =        3.2500
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # CHLORIDE (CL) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\CL.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\CL.MTW
MTB > #
MTB > DESCRIBE 'CL' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
CL              1       27    76.00    51.00    75.40    48.39     9.31
                6       12    68.25    59.00    61.50    27.67     7.99
                7       10   167.70   170.00   168.50     9.62     3.04

             WELL      MIN      MAX       Q1       Q3
CL              1    24.00   143.00    30.00   130.00
                6    51.00   153.00    56.00    71.50
                7   150.00   179.00   158.75   175.50

MTB > BOXPLOT 'CL' ;
SUBC> BY 'WELL'.

WELL

              ----------------------------------
1           --I      +                         I-----
              ----------------------------------


                       -----
6                    --I+  I--                           O
                       -----


                                                         ------
7                                                     ---I   +I--
                                                         ------

          ----+---------+---------+---------+---------+---------+--CL
             30        60        90       120       150       180


MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # CHLORIDE (CL) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # KRUSKAL-WALLIS COMPARISON OF MEDIANS
MTB > #
MTB > KRUSKAL-WALLIS 'CL' 'WELL' .

LEVEL    NOBS    MEDIAN  AVE. RANK   Z VALUE
    1      27     51.00       19.2     -3.13
    6      12     59.00       21.8     -0.90
    7      10    170.00       44.4      4.81
OVERALL    49                 25.0

H = 23.43  d.f. = 2  p = 0.000
H = 23.44  d.f. = 2  p = 0.000 (adj. for ties)
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # CHLORIDE (CL) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # MANN-WHITNEY COMPARISON OF MEDIANS
MTB > #
MTB > MANN-WHITNEY 99 '6' '1';
SUBC> ALTERNATIVE 1.

Mann-Whitney Confidence Interval and Test

6          N =  12     Median =       59.00
1          N =  27     Median =       51.00
Point estimate for ETA1-ETA2 is      13.50
99.1 pct c.i. for ETA1-ETA2 is (-66.99,31.00)
W = 260.5
Test of ETA1 = ETA2  vs.  ETA1 g.t. ETA2 is significant at 0.2714
The test is significant at 0.2713 (adjusted for ties)

Cannot reject at alpha = 0.05

MTB > #
MTB > MANN-WHITNEY 99 '7' '1';
SUBC> ALTERNATIVE 1.

Mann-Whitney Confidence Interval and Test

7          N =  10     Median =      170.00
1          N =  27     Median =       51.00
Point estimate for ETA1-ETA2 is     109.50
99.0 pct c.i. for ETA1-ETA2 is (39.01,141.01)
W = 325.0
Test of ETA1 = ETA2  vs.  ETA1 g.t. ETA2 is significant at 0.0000
The test is significant at 0.0000 (adjusted for ties)(
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # CHEMICAL OXYGEN DEMAND (COD) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\COD.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\COD.MTW
MTB > #
MTB > DESCRIBE 'COD' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
COD             1       27    15.44    10.00    14.64    12.10     2.33
                6       12     35.0     19.5     21.3     54.8     15.8
                7       10    22.60    21.00    20.13    13.84     4.38

             WELL      MIN      MAX       Q1       Q3
COD             1     4.90    46.00     7.00    17.00
                6      3.0    204.0      7.5     37.5
                7     8.00    57.00    11.50    25.25

MTB > BOXPLOT 'COD' ;
SUBC> BY 'WELL'.

WELL

            ---
1          -I+I--- * *O
            ---

            --------
6          -I   +   I--                                  O
            --------

             ----
7           -I +I-      *
             ----
          +---------+---------+---------+---------+---------+------COD
          0        40        80       120       160       200

MTB > #
MTB > # BIGTIMBER LANDFILL; STATISTICAL WORKSHEET, APRIL 2001
MTB > # CHEMICAL OXYGEN DEMAND (COD) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # KRUSKAL-WALLIS COMPARISON OF MEDIANS
MTB > #
MTB > KRUSKAL-WALLIS 'COD' 'WELL' .

LEVEL     NOBS    MEDIAN   AVE. RANK   Z VALUE
    1       27     10.00        21.4     -1.98
    6       12     19.50        27.9      0.81
    7       10     21.00        31.4      1.58
OVERALL     49                  25.0

H = 4.24  d.f. = 2  p = 0.121
H = 4.24  d.f. = 2  p = 0.120 (adj. for ties)
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # CHROMIUM (CR) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\CR.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\CR.MTW
MTB > #
MTB > DESCRIBE 'CR' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
CR              1       27  0.00270  0.00200  0.00240  0.00257  0.00049
                6       12  0.00225  0.00200  0.00180  0.00191  0.00055
                7       10  0.00200  0.00200  0.00175  0.00125  0.00039

             WELL      MIN      MAX       Q1       Q3
CR              1  0.00100  0.01200  0.00100  0.00300
                6  0.00100  0.00800  0.00100  0.00200
                7  0.00100  0.00500  0.00100  0.00225

MTB > BOXPLOT 'CR' ;
SUBC> BY 'WELL'.

WELL

             -------
1          --I  +  I--    *                             O         O
             -------

           ------
6          I    +-----                        O
           ------

           ------
7          I    +-----         *
           ------
          ------+---------+---------+---------+---------+---------+CR
           0.0020    0.0040    0.0060    0.0080    0.0100    0.0120

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # CHROMIUM (CR) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # CONTINGENCY TABLE OF NON-DETECTS (ND) VS. DETECTS (D)
MTB > #
MTB > CHISQUARE '1' '6' '7'.

Expected counts are printed below observed counts

             1        6        7    Total
    1       20        9        7       36
         19.84     8.82     7.35

    2        7        3        3       13
          7.16     3.18     2.65

Total       27       12       10       49

ChiSq =  0.001 +  0.004 +  0.016 +
         0.004 +  0.011 +  0.045 = 0.081
df = 2
2 cells with expected counts less than 5.0
```

```
MTB > #
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # COBALT (CO) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\CO.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\CO.MTW
MTB > #
MTB > DESCRIBE 'CO' ;
SUBC> BY 'WELL'.

             WELL       N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
CO              1      27    1.833    2.500    1.840    0.760    0.146
                6      12    2.042    1.750    1.750    1.453    0.419
                7      10    1.600    1.000    1.562    0.775    0.245

             WELL       MIN      MAX       Q1       Q3
CO              1     1.000    2.500    1.000    2.500
                6     1.000    6.000    1.000    2.500
                7     1.000    2.500    1.000    2.500

MTB > BOXPLOT 'CO' ;
SUBC> BY 'WELL'.

WELL

              ----------------
1             I              +
              ----------------

              ----------------
6             I       +      I                                  *
              ----------------

              ----------------
7             +              I
              ----------------
          ----+---------+---------+---------+---------+---------+--CO
             1.0       2.0       3.0       4.0       5.0       6.0

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # COBALT (CO) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # COMPARISON OF DOWNGRADIENT COUNT TO POISSON PREDICTION LIMIT
   N      =    27
   SUM    =      49.500
   N      =    22

 ROW     N  COUNT     K  CONF     LIMIT

   1    27   49.5    22  0.95   56.1591

MTB > # DOWNGRADIENT POISSON COUNT
MTB > SUM 'DG'
   SUM    =      40.500
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # COPPER (CU) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\CU.MTW'
 WORKSHEET SAVED  6/20/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\CU.MTW
MTB > #
MTB > DESCRIBE 'CU' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
CU              1       27  0.00252  0.00100  0.00196  0.00347  0.00067
                6       12  0.00158  0.00100  0.00140  0.00100  0.00029
                7       10  0.00470  0.00100  0.00125  0.01102  0.00348

             WELL      MIN      MAX       Q1       Q3
CU              1  0.00100  0.01800  0.00100  0.00300
                6  0.00100  0.00400  0.00100  0.00200
                7  0.00100  0.03600  0.00100  0.00150

MTB > BOXPLOT 'CU' ;
SUBC> BY 'WELL'.

WELL

           ----
1          +  I--  *O                O
           ----

           ---
6          + I- *
           ---

           -
7          +  O                                              O
           -
          +---------+---------+---------+---------+---------+------CU
     0.0000    0.0070    0.0140    0.0210    0.0280    0.0350

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # COPPER (CU) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # CONTINGENCY TABLE OF NON-DETECTS (ND) VS. DETECTS (D)
MTB > #
MTB > CHISQUARE '1' '6' '7'.

Expected counts are printed below observed counts

             1        6        7    Total
    1       12        7        8       27
         14.88     6.61     5.51

    2       15        5        2       22
         12.12     5.39     4.49

Total       27       12       10       49

ChiSq =  0.557 +  0.023 +  1.125 +
         0.683 +  0.028 +  1.381 = 3.796
df = 2
1 cells with expected counts less than 5.0
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # IRON (FE) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\FE.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\FE.MTW
MTB > #
MTB > DESCRIBE 'FE' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN    MEDIAN    TRMEAN     STDEV    SEMEAN
FE              1       27   0.0626   0.0500    0.0524    0.0547    0.0105
                6       12   0.1233   0.0500    0.0570    0.2324    0.0671
                7       10  0.05000  0.05000   0.05000   0.00000   0.00000

             WELL       MIN      MAX        Q1        Q3
FE              1    0.0500   0.3300    0.0500    0.0500
                6    0.0500   0.8600    0.0500    0.0725
                7   0.05000  0.05000   0.05000   0.05000

MTB > BOXPLOT 'FE' ;
SUBC> BY 'WELL'.

WELL

             -
1            +   O              O
             -

             --
6            +I-*                                              O
             --

             -
7            +
             -
            --------+---------+---------+---------+---------+--------FE
                  0.15      0.30      0.45      0.60      0.75

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # IRON (FE) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # CONTINGENCY TABLE OF NON-DETECTS (ND) VS. DETECTS (D)
MTB > #
MTB > CHISQUARE '1' '6' '7'.

Expected counts are printed below observed counts

              1        6        7    Total
    1        25        8        9       42
          23.14    10.29     8.57

    2         2        4        1        7
           3.86     1.71     1.43

Total        27       12       10       49

ChiSq =   0.149 +  0.508 +  0.021 +
          0.894 +  3.048 +  0.129 = 4.749
df = 2
3 cells with expected counts less than 5.0
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # NICKEL (NI) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\NI.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\NI.MTW
MTB > #
MTB > DESCRIBE 'NI' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
NI              1       27    13.52    10.00    13.00     6.77     1.30
                6       12    11.25    10.00    10.00     4.33     1.25
                7       10   10.000   10.000   10.000    0.000    0.000

             WELL      MIN      MAX       Q1       Q3
NI              1    10.00    30.00    10.00    10.00
                6    10.00    25.00    10.00    10.00
                7   10.000   10.000   10.000   10.000

MTB > BOXPLOT 'NI' ;
SUBC> BY 'WELL'.

WELL

             -
1            +                                     O           O
             -

             -
6            +                                     O
             -


             -
7            +
             -
          --------+---------+---------+---------+---------+--------NI
               12.0      16.0      20.0      24.0      28.0

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # NICKEL (NI) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # COMPARISON OF DOWNGRADIENT COUNT TO POISSON PREDICTION LIMIT
   N       =     27
   SUM     =      365.00
   N       =     22

 ROW     N  COUNT      K   CONF      LIMIT

   1    27    365     22   0.95    338.236

MTB > # DOWNGRADIENT POISSON COUNT
MTB > SUM 'DG'
   SUM     =       8.3000
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # pH - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\PH.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\PH.MTW
MTB > #
MTB > DESCRIBE 'PH' ;
SUBC> BY 'WELL'.

             WELL       N      MEAN    MEDIAN    TRMEAN     STDEV    SEMEAN
PH              1      27    8.1704    8.1000    8.1560    0.4639    0.0893
                6      12     8.317     8.500     8.370     0.369     0.106
                7      10    7.6500    7.7000    7.6750    0.1434    0.0453

             WELL       MIN       MAX        Q1        Q3
PH              1    7.6000    9.1000    7.7000    8.6000
                6     7.500     8.600     8.200     8.600
                7    7.3000    7.8000    7.6000    7.7250

MTB > BOXPLOT 'PH' ;
SUBC> BY 'WELL'.

WELL

                         ----------------------------
1                     ---I          +              I--------------
                         ----------------------------

                                        -------------
6                  *     ---------------I        +  I
                                        -------------

                      ----
7             *       I  +---
                      ----
           ----+---------+---------+---------+---------+---------+--PH

            7.35      7.70      8.05      8.40      8.75      9.10

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # pH - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # KRUSKAL-WALLIS COMPARISON OF MEDIANS
MTB > #
MTB > KRUSKAL-WALLIS 'PH' 'WELL' .

LEVEL     NOBS     MEDIAN  AVE. RANK   Z VALUE
    1       27      8.100       27.9      1.58
    6       12      8.500       30.3      1.49
    7       10      7.700       10.8     -3.53
OVERALL     49                  25.0

H = 12.74  d.f. = 2  p = 0.002
H = 13.05  d.f. = 2  p = 0.002 (adj. for ties)
```

```
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # pH - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # MANN-WHITNEY COMPARISON OF MEDIANS
MTB > #
MTB > MANN-WHITNEY 99 '6' '1';
SUBC> ALTERNATIVE 1.

Mann-Whitney Confidence Interval and Test

6          N =  12     Median =       8.5000
1          N =  27     Median =       8.1000
Point estimate for ETA1-ETA2 is       0.1000
99.1 pct c.i. for ETA1-ETA2 is (-0.2001,0.6997)
W = 257.0
Test of ETA1 = ETA2  vs.  ETA1 g.t. ETA2 is significant at 0.3078
The test is significant at 0.3057 (adjusted for ties)

Cannot reject at alpha = 0.05

MTB > #
MTB > MANN-WHITNEY 99 '7' '1';
SUBC> ALTERNATIVE 1.

Mann-Whitney Confidence Interval and Test

7          N =  10     Median =       7.7000
1          N =  27     Median =       8.1000
Point estimate for ETA1-ETA2 is      -0.4000
99.0 pct c.i. for ETA1-ETA2 is (-1.0001,-0.1000)
W = 94.5
Test of ETA1 = ETA2  vs.  ETA1 g.t. ETA2
Cannot reject since W is l.t. 190.0
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # ANTIMONY (SB) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\SB.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\SB.MTW
MTB > #
MTB > DESCRIBE 'SB' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
SB              1       27  0.00344  0.00300  0.00328  0.00187  0.00036
                6       12  0.00325  0.00300  0.00290  0.00171  0.00049
                7       10  0.00270  0.00300  0.00275  0.00048  0.00015

             WELL      MIN      MAX       Q1       Q3
SB              1  0.00200  0.00900  0.00200  0.00300
                6  0.00200  0.00800  0.00200  0.00300
                7  0.00200  0.00300  0.00200  0.00300

MTB > BOXPLOT 'SB' ;
SUBC> BY 'WELL'.

WELL

                --------
1               I      +               *               O       O
                --------

                --------
6               I      +        *                      O
                --------

                --------
7               I      +
                --------
           --+---------+---------+---------+---------+---------+----SB
        0.0015    0.0030    0.0045    0.0060    0.0075    0.0090

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # ANTIMONY (SB) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # CONTINGENCY TABLE OF NON-DETECTS (ND) VS. DETECTS (D)
MTB > #
MTB > CHISQUARE '1' '6' '7'.

Expected counts are printed below observed counts

              1        6        7    Total
    1        22       10       10       42
          23.14    10.29     8.57

    2         5        2        0        7
           3.86     1.71     1.43

Total        27       12       10       49

ChiSq =  0.056 +  0.008 +  0.238 +
         0.339 +  0.048 +  1.429 = 2.117
df = 2
3 cells with expected counts less than 5.0
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # SPECIFIC CONDUCTANCE (SC) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\SC.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\SC.MTW
MTB > #
MTB > DESCRIBE 'SC' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
SC              1       27    974.0    566.0    964.7    517.3     99.5
                6       12    681.8    577.0    624.9    274.2     79.2
                7       10   1266.0   1265.0   1268.7     49.9     15.8

             WELL      MIN      MAX       Q1       Q3
SC              1    450.0   1730.0    530.0   1520.0
                6    472.0   1460.0    550.0    747.0
                7   1170.0   1340.0   1235.0   1305.0

MTB > BOXPLOT 'SC' ;
SUBC> BY 'WELL'.

WELL

               ---------------------------------------
1           ---I +                                   I----------
               ---------------------------------------

                -------
6            ---I+    I---------                    O
                -------

                                            ---
7                                        ---I+I--
                                            ---
          ----+---------+---------+---------+---------+---------+--SC
            500       750      1000      1250      1500      1750

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # SPECIFIC CONDUCTANCE (SC) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # KRUSKAL-WALLIS COMPARISON OF MEDIANS
MTB > #
MTB > KRUSKAL-WALLIS 'SC' 'WELL' .

LEVEL    NOBS    MEDIAN  AVE. RANK   Z VALUE
    1      27     566.0       24.1     -0.47
    6      12     577.0       19.9     -1.43
    7      10    1265.0       33.5      2.11
OVERALL    49                 25.0

H = 5.18  d.f. = 2  p = 0.075
H = 5.18  d.f. = 2  p = 0.075 (adj. for ties)
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # SELENIUM (SE) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\SE.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\SE.MTW
MTB > #
MTB > DESCRIBE 'SE' ;
SUBC> BY 'WELL'.

             WELL       N      MEAN    MEDIAN    TRMEAN     STDEV    SEMEAN
SE              1      27   0.00781   0.00500   0.00668   0.00743   0.00143
                6      12   0.00550   0.00500   0.00500   0.00173   0.00050
                7      10   0.00570   0.00500   0.00500   0.00221   0.00070

             WELL       MIN       MAX        Q1        Q3
SE              1   0.00500   0.03900   0.00500   0.00500
                6   0.00500   0.01100   0.00500   0.00500
                7   0.00500   0.01200   0.00500   0.00500

MTB > BOXPLOT 'SE' ;
SUBC> BY 'WELL'.

WELL

                 -
1                + O   O      O     O  O                          O
                 -

                 -
6                +        O
                 -

                 -
7                +         O
                 -
           ---------+---------+---------+---------+---------+--------SE
               0.0070    0.0140    0.0210    0.0280    0.0350
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # SELENIUM (SE) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # CONTINGENCY TABLE OF NON-DETECTS (ND) VS. DETECTS (D)
MTB > #
MTB > CHISQUARE '1' '6' '7'.

Expected counts are printed below observed counts

             1          6          7    Total
    1        6         11          8       25
         13.78       6.12       5.10

    2       21          1          2       24
         13.22       5.88       4.90

Total       27         12         10       49

ChiSq =  4.389 +  3.886 +  1.646 +
         4.572 +  4.048 +  1.715 = 20.255
df = 2
1 cells with expected counts less than 5.0

MTB > #
MTB > CHISQUARE '1' '6'.

Expected counts are printed below observed counts

             1          6    Total
    1        6         11       17
         11.77       5.23

    2       21          1       22
         15.23       6.77

Total       27         12       39

ChiSq =  2.828 +  6.363 +
         2.185 +  4.917 = 16.293
df = 1

MTB > CHISQUARE '1' '7'.

Expected counts are printed below observed counts

             1          7    Total
    1        6          8       14
         10.22       3.78

    2       21          2       23
         16.78       6.22

Total       27         10       37

ChiSq =  1.740 +  4.698 +
         1.059 +  2.860 = 10.357
df = 1
1 cells with expected counts less than 5.0
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # SULFATE (SO4) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\SO4.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\SO4.MTW
MTB > #
MTB > DESCRIBE 'SO4' ;
SUBC> BY 'WELL'.

             WELL        N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
SO4             1       27    241.4    172.0    239.3    114.8     22.1
                6       12    156.5    115.5    147.9     76.6     22.1
                7       10   225.60   226.00   225.13     5.74     1.81

             WELL      MIN      MAX       Q1       Q3
SO4             1    102.0    434.0    147.0    361.0
                6     93.0    306.0    100.5    237.0
                7   218.00   237.00   219.75   228.00

MTB > BOXPLOT 'SO4' ;
SUBC> BY 'WELL'.

WELL

                       -------------------------------
1                ------I   +                         I-----------
                       -------------------------------

                 -----------------
6              --I +             I-------------
                 -----------------

                                 --
7                                I+--
                                 --
          --+---------+---------+---------+---------+---------+----SO4
           70       140       210       280       350       420

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # SULFATE (SO4) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # KRUSKAL-WALLIS COMPARISON OF MEDIANS
MTB > #
MTB > KRUSKAL-WALLIS 'SO4' 'WELL' .

LEVEL    NOBS    MEDIAN  AVE. RANK  Z VALUE
    1      27     172.0       27.5     1.38
    6      12     115.5       14.7    -2.87
    7      10     226.0       30.5     1.36
OVERALL    49                 25.0

H = 8.56  d.f. = 2  p = 0.014
H = 8.56  d.f. = 2  p = 0.014 (adj. for ties)
```

```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # SULFATE (SO4) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # MANN-WHITNEY COMPARISON OF MEDIANS
MTB > #
MTB > MANN-WHITNEY 99 '6' '1';
SUBC> ALTERNATIVE 1.

Mann-Whitney Confidence Interval and Test

6       N =  12     Median =        115.5
1       N =  27     Median =        172.0
Point estimate for ETA1-ETA2 is     -55.0
99.1 pct c.i. for ETA1-ETA2 is (-224.0,-9.0)
W = 146.5
Test of ETA1 = ETA2  vs.  ETA1 g.t. ETA2
Cannot reject since W is l.t. 240.0

MTB > #
MTB > MANN-WHITNEY 99 '7' '1';
SUBC> ALTERNATIVE 1.

Mann-Whitney Confidence Interval and Test

7       N =  10     Median =       226.00
1       N =  27     Median =       172.00
Point estimate for ETA1-ETA2 is     54.50
99.0 pct c.i. for ETA1-ETA2 is (-137.98,78.99)
W = 215.0
Test of ETA1 = ETA2  vs.  ETA1 g.t. ETA2 is significant at 0.2010
The test is significant at 0.2010 (adjusted for ties)

Cannot reject at alpha = 0.05
```

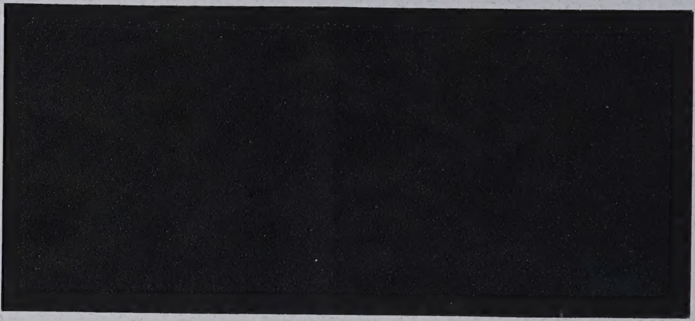
```
MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # ZINC (ZN) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # DESCRIPTIVE STATISTICS AND BOXPLOTS
MTB > RETRIEVE 'N:\BIGTIM\STAT0401\ZN.MTW'
 WORKSHEET SAVED  6/ 6/2001

Worksheet retrieved from file: N:\BIGTIM\STAT0401\ZN.MTW
MTB > #
MTB > DESCRIBE 'ZN' ;
SUBC> BY 'WELL'.

             WELL          N     MEAN   MEDIAN   TRMEAN    STDEV   SEMEAN
ZN              1         27  0.02667  0.02000  0.02080  0.03088  0.00594
                6         12  0.02333  0.02000  0.02000  0.01155  0.00333
                7         10  0.02200  0.02000  0.02000  0.00632  0.00200

             WELL        MIN      MAX       Q1       Q3
ZN              1    0.02000  0.18000  0.02000  0.02000
                6    0.02000  0.06000  0.02000  0.02000
                7    0.02000  0.04000  0.02000  0.02000

MTB > BOXPLOT 'ZN' ;
SUBC> BY 'WELL'.

WELL

             -
1            +      O                                             O
             -

             -
6            +            O
             -

             -
7            +      O
             -
          ------+---------+---------+---------+---------+---------+ZN
              0.030     0.060     0.090     0.120     0.150     0.180

MTB > #
MTB > # BIGTIMBER LANDFILL, STATISTICAL WORKSHEET, APRIL 2001
MTB > # ZINC (ZN) - WELL UGGROUP VS. BT-6 AND BT-7
MTB > # CONTINGENCY TABLE OF NON-DETECTS (ND) VS. DETECTS (D)
MTB > #
MTB > CHISQUARE '1' '6' '7'.

Expected counts are printed below observed counts

             1        6        7    Total
    1       24       11        9       44
         24.24    10.78     8.98

    2        3        1        1        5
          2.76     1.22     1.02

Total       27       12       10       49

ChiSq =  0.002 +  0.005 +  0.000 +
         0.022 +  0.041 +  0.000 = 0.071
df = 2
3 cells with expected counts less than 5.0
```

```
MTB > # BIG TIMBER SANITARY LANDFILL
MTB > # STATISTICAL EVALUATION WORKSHEET
MTB > # MANN-KENDALL TREND ANALYSIS
MTB > # CHLORIDE - WELL BT-07
 WORKSHEET SAVED  7/24/2001

Worksheet retrieved from file: N:\BIGTIM\BT07MK\BT07.MTW
MTB > #
MTB > # DESCRIPTIVE STATISTICS OF CONCENTRATION (MG/L)
MTB > #
MTB > DESCRIBE 'CL'

                N      MEAN    MEDIAN    TRMEAN     STDEV    SEMEAN
CL             10    167.70    170.00    168.50      9.62      3.04

              MIN       MAX        Q1        Q3
CL         150.00    179.00    158.75    175.50

MTB > #
MTB > # SCATTER PLOT OF CONCENTRATION (MG/L) OVER TIME (JULIAN DATE)
MTB > #
MTB > PLOT 'CL' 'DATE' ;
SUBC> SYMBOL 'X'.

      180+                                                        X
         -               X
 CL      - X
         -
         -                                              X
      170+         X           X                             X
         -
         -
         -
         -
      160+                                    X
         -
         -                               X
         -
         -
      150+                                         X
         -
            --------+---------+---------+---------+---------+--------
DATE
               35350     35700     36050     36400     36750

MTB > #
MTB > # MANN-KENDALL TREND ANALYSIS
MTB > #

 ROW     N    S         TAU    P VALUE

   1    10   -4  -0.0888889   0.394223

MTB > # N - SAMPLE SIZE; S - MANN-KENDALL STATISTIC; TAU - KENDALL'S
TAU;
MTB > # P VALUE - PROBABILITY OF SIGNIFICANCE OF TREND (NORMAL APPROX.)
```

Sweetgrass C
Big Timber # 308
grdwtr (ANALY)

# OCTOBER 2000
# GROUNDWATER MONITORING RESULTS
# BIG TIMBER SANITARY LANDFILL
# BIG TIMBER, MONTANA

MAXIM
TECHNOLOGIES INC®



# OCTOBER 2000
# GROUNDWATER MONITORING RESULTS
# BIG TIMBER SANITARY LANDFILL
# BIG TIMBER, MONTANA

#308

MAXIM
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*Fax: (406) 248-9282*

November 28, 2000

Mr. Willy Littell
City of Big Timber
P.O. Box 416
Big Timber, MT 59011

**SUBJECT:** **October 2000 Groundwater Monitoring Results**
**Big Timber Sanitary Landfill**
**Big Timber, Montana**
**Maxim Project No. 9731053.100**

Dear Mr. Littell:

The attached report presents groundwater monitoring data collected by Maxim Technologies, Inc. (Maxim), during October 2000 at the Big Timber Sanitary Landfill in Big Timber, Montana. The work was conducted in accordance with our proposal dated July 5, 1994 and the terms and conditions of the Professional Services Agreement between Maxim and the City of Big Timber dated September 30, 1994.

Concentrations of all parameters measured during this monitoring event were below regulatory enforcement standards. These results were similar to previous monitoring events. For your convenience copies of this report have been forwarded to the Montana Department of Environmental Quality.

If you have any questions regarding this report or any aspect of the project, please do not hesitate to call us. We appreciate the opportunity to serve your environmental consulting needs.

Respectfully Submitted,

**Maxim Technologies, Inc.®**

Jeffrey R. Rice
Environmental Group Manager

Patrick J. Thomson
Environmental Scientist

JRR(PJT)rr

n:\typing\envir\9731053\Big Timber Oct 00 GW.wpd

Enclosures
cc: Pat Crowley, MDEQ, Helena
Erl Tufte, Morrison Maierle, Inc., Billings

RECEIVED
NOV 29 2000
MONTANA
DEPT. OF ENVIRONMENTAL QUALITY
COMMUNITY SERVICES BUREAU

# OCTOBER 2000
# GROUNDWATER MONITORING RESULTS
# BIG TIMBER SANITARY LANDFILL
# BIG TIMBER, MONTANA

Prepared for:

City of Big Timber
P.O. Box 416
Big Timber, Montana 59011

Prepared by:

Maxim Technologies, Inc.
P.O. Box 30615
Billings, Montana 59107

Maxim Project No. 9731053.100

November 2000

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## 1.0 INTRODUCTION

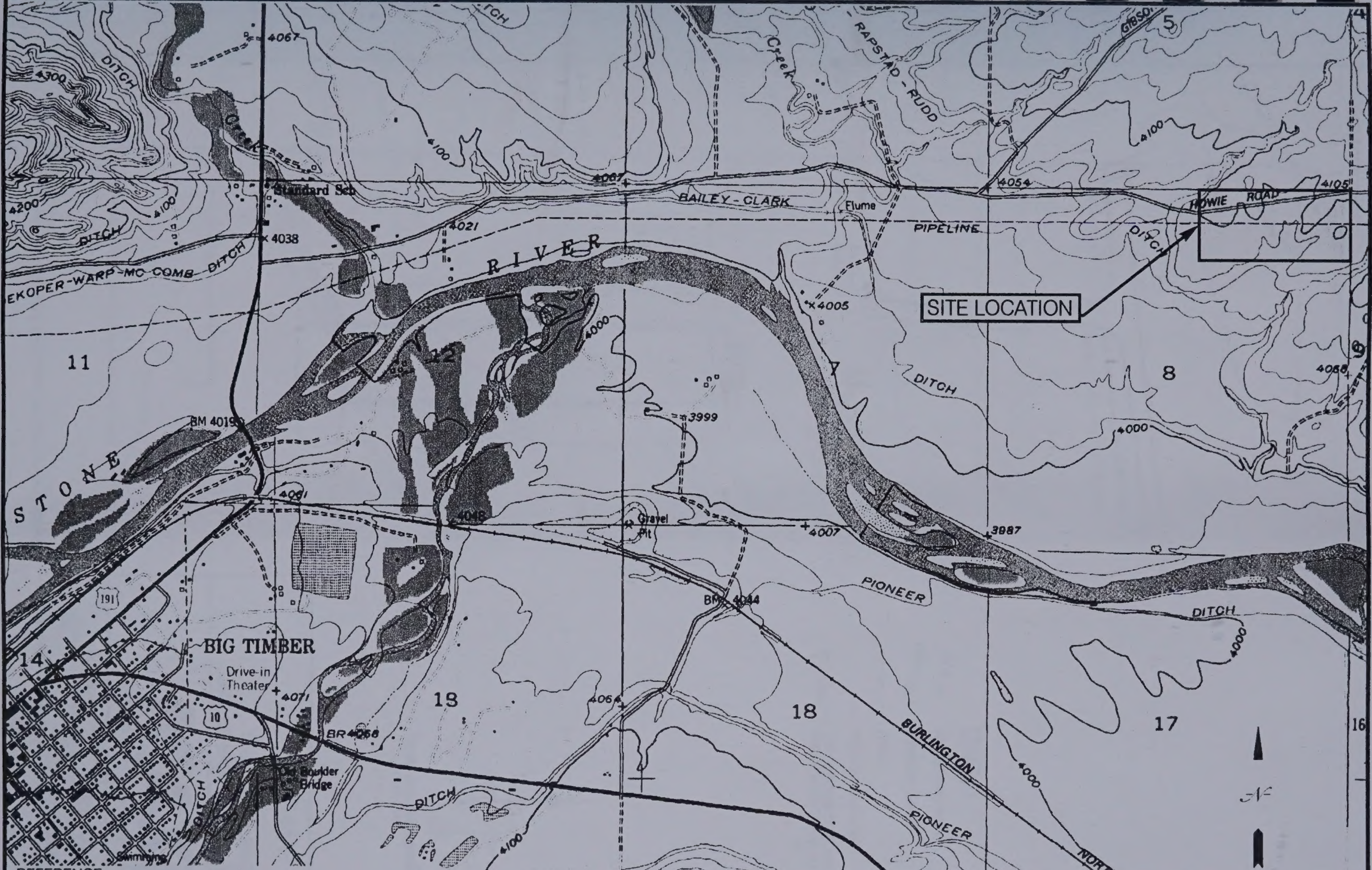
This report presents groundwater monitoring data collected by Maxim Technologies, Inc., (Maxim), at the Big Timber Sanitary Landfill (Figures 1 and 2) on October 18, 2000. Maxim personnel completed groundwater monitoring activities at the landfill in accordance with the Professional Services Agreement between the City of Big Timber and Maxim, dated September 30, 1994 and the Sampling and Analysis Plan dated April 1995 (Maxim, 1995).

The Big Timber Sanitary landfill stopped accepting waste during April 1997 and has completed implementation of its closure plan. The Administrative Rules of Montana Title 17, Chapter 50, Sub-Chapter 7 (ARM 17.50.7), require semi-annual groundwater monitoring at Class II municipal solid waste landfills. This monitoring event was conducted to fulfill post-closure monitoring requirements of these rules. Methods used to complete groundwater monitoring activities and results of this monitoring event are described in Sections 2.0 and 3.0 of this report.

## 2.0 METHODS

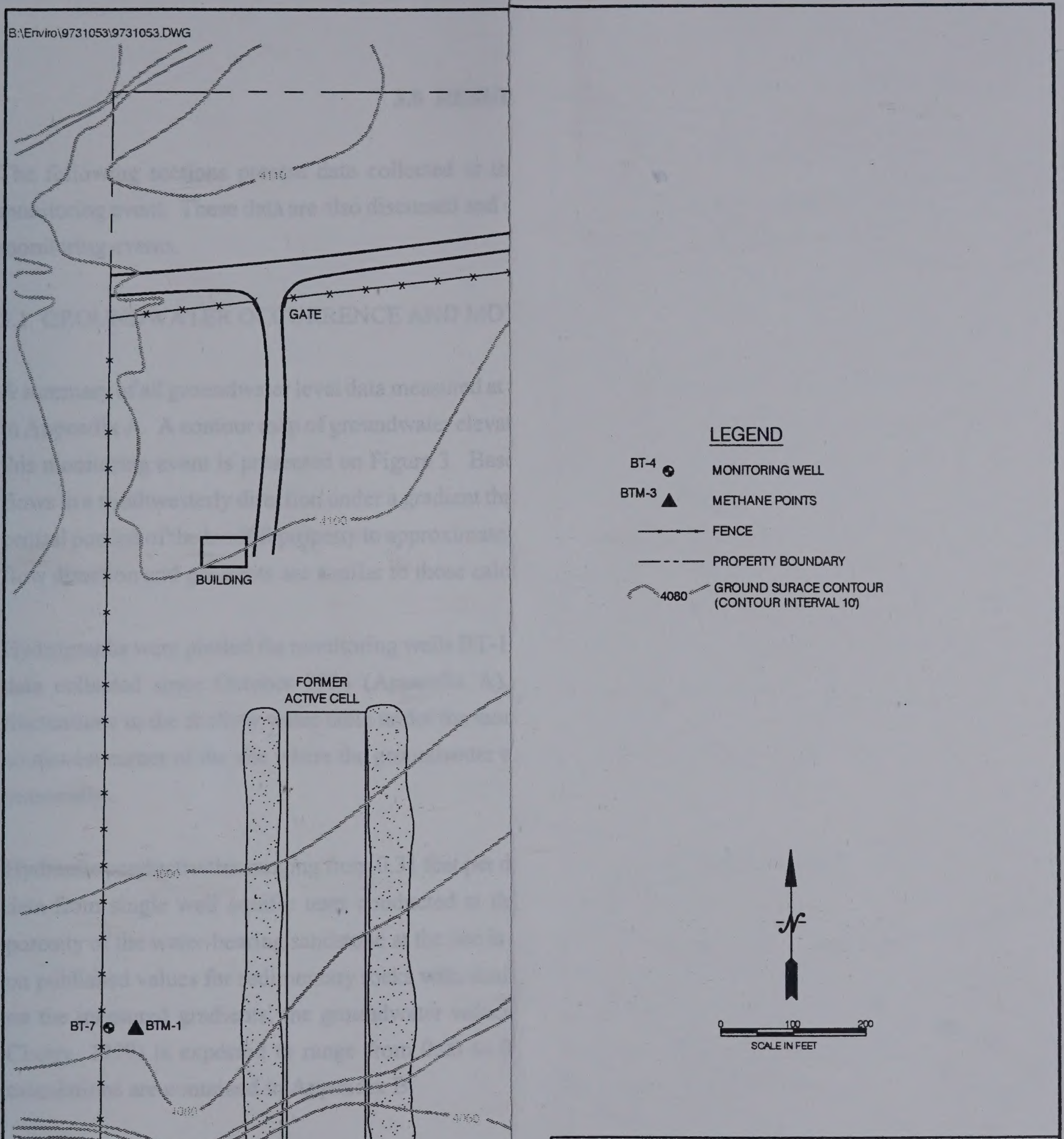
Field data collection activities and laboratory analyses were completed in accordance with procedures described in Maxim's Sampling and Analysis Plan (Maxim, 1995). In accordance with correspondence from the MDEQ Waste Management Division dated April 12, 1995, deviations from the Sampling and Analysis Plan included the following:

- Groundwater samples were not collected from monitoring wells BT-1D and BT-3 through BT-5.
- A groundwater sample was collected from monitoring well BT-7.


SITE LOCATION
HOWIE ROAD
BAILEY-CLARK
Flume
PIPELINE
DITCH
RIVER
STONE
EKOPER-WARP-MC COMB DITCH
Standard Sch
Creek
RAPSTAD-RUDD
GIBSON
BIG TIMBER
Drive-in Theater
Gravel Pit
Old Boulder Bridge
Swimming
PIONEER DITCH
PIONEER
BURLINGTON NORTHERN
BM 4019
BM 4044
BR 4058
191
10
4067
4300
4200
4100
4038
4021
4054
4105
4005
4000
3999
4061
4048
4007
3987
4068
4071
4064
4127
5
7
8
9
11
12
13
14
16
17
18
N
0
1000
2000
Scale In Feet

REFERENCE:
U.S.G.S. Big Timber Quadrangle, Sweet Grass County, Montana
7.5 minute series (Topographic), 1954, Photorevised 1981.

| MAXIM TECHNOLOGIES INC® | SITE LOCATION MAP<br>City Of Big Timber Sanitary Landfill<br>Sweet Grass County, Montana | DATE: 11/02/2000<br>REVIEWED: JRR<br>PROJ. NO.: 9731053 | DRAWN BY: WGS<br>SCALE: 1" = 2000'<br>FIGURE NO.: 1 |
|---|---|---|---|

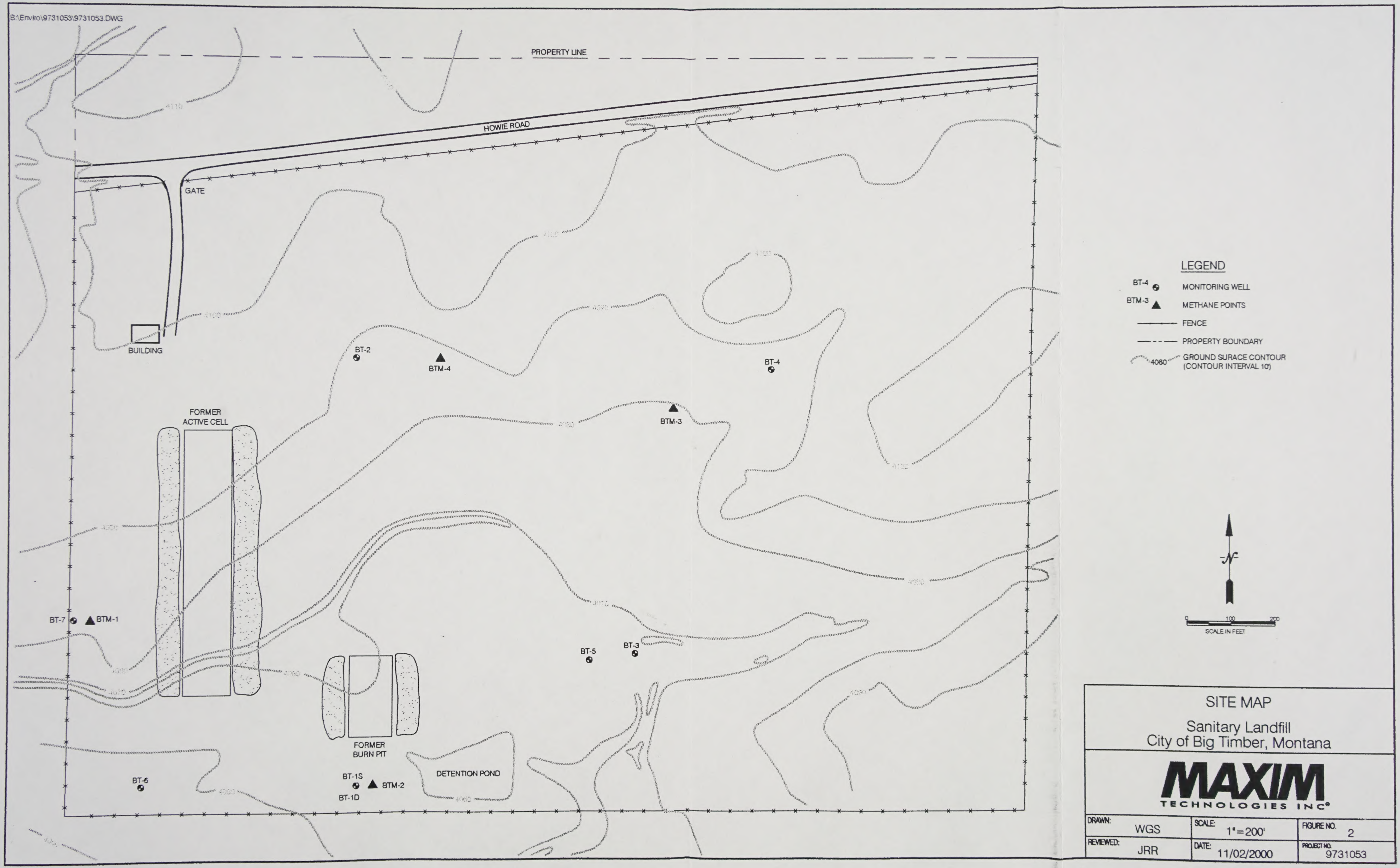

B:\Enviro\9731053\9731053.DWG
4110
GATE
4100
BUILDING
FORMER ACTIVE CELL
4090
BT-7
BTM-1
4080
4070
4060
BT-6
4050
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
N
0 100 200
SCALE IN FEET

SITE MAP

Sanitary Landfill
City of Big Timber, Montana

MAXIM
TECHNOLOGIES INC®

| | | |
|---|---|---|
| DRAWN: WGS | SCALE: 1"=200' | FIGURE NO. 2 |
| REVIEWED: JRR | DATE: 11/02/2000 | PROJECT NO. 9731053 |


B:\Enviro\9731053\9731053.DWG
PROPERTY LINE
HOWIE ROAD
GATE
BUILDING
4110
4100
4090
4080
4070
4060
BT-2
BTM-4
BT-4
BTM-3
FORMER ACTIVE CELL
BT-7
BTM-1
BT-5
BT-3
FORMER BURN PIT
DETENTION POND
BT-6
BT-1S
BT-1D
BTM-2
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
N
0
100
200
SCALE IN FEET
MAXIM TECHNOLOGIES INC®

SITE MAP

Sanitary Landfill
City of Big Timber, Montana

| | | |
|---|---|---|
| DRAWN: WGS | SCALE: 1"=200' | FIGURE NO. 2 |
| REVIEWED: JRR | DATE: 11/02/2000 | PROJECT NO. 9731053 |

# 3.0 RESULTS

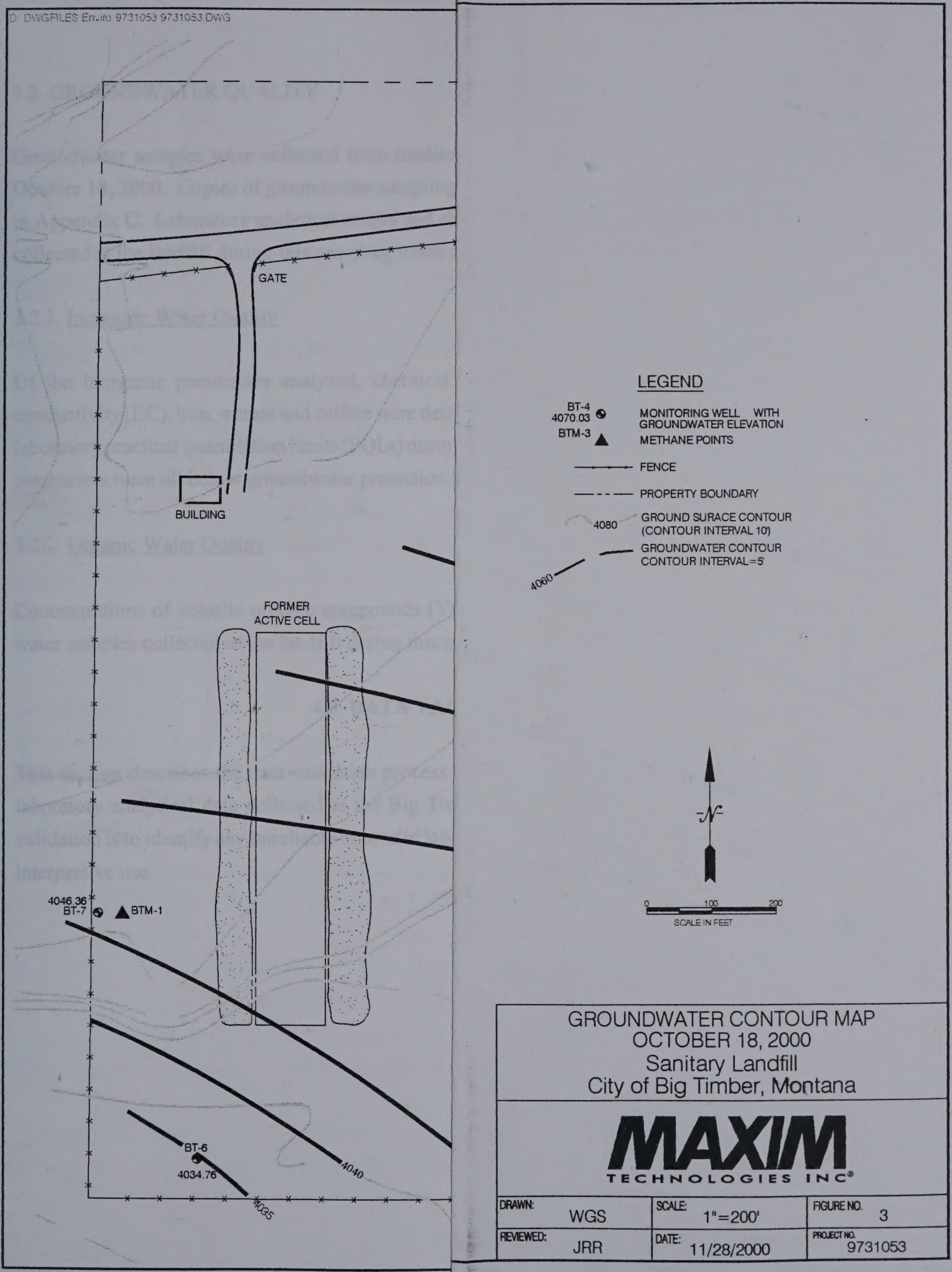
The following sections present data collected at the Big Timber Sanitary Landfill during this monitoring event. These data are also discussed and compared with data collected during previous monitoring events.

## 3.1 GROUNDWATER OCCURRENCE AND MOVEMENT

A summary of all groundwater level data measured at the landfill since September 1989 is contained in Appendix A. A contour map of groundwater elevations calculated from the data collected during this monitoring event is presented on Figure 3. Based on the groundwater contours, groundwater flows in a southwesterly direction under a gradient that varies from approximately 2.7 percent in the central portion of the landfill property to approximately 4.2 percent in the southwestern portion. The flow direction and gradients are similar to those calculated from previous measurements.

Hydrographs were plotted for monitoring wells BT-1S, BT-4, BT-5, and BT-6 using the water level data collected since October 1994 (Appendix A). These hydrographs indicate that seasonal fluctuations in the shallow water table under the landfill are generally not significant except in the southwest corner of the site where the groundwater elevation in well BT-6 fluctuates over five feet seasonally..

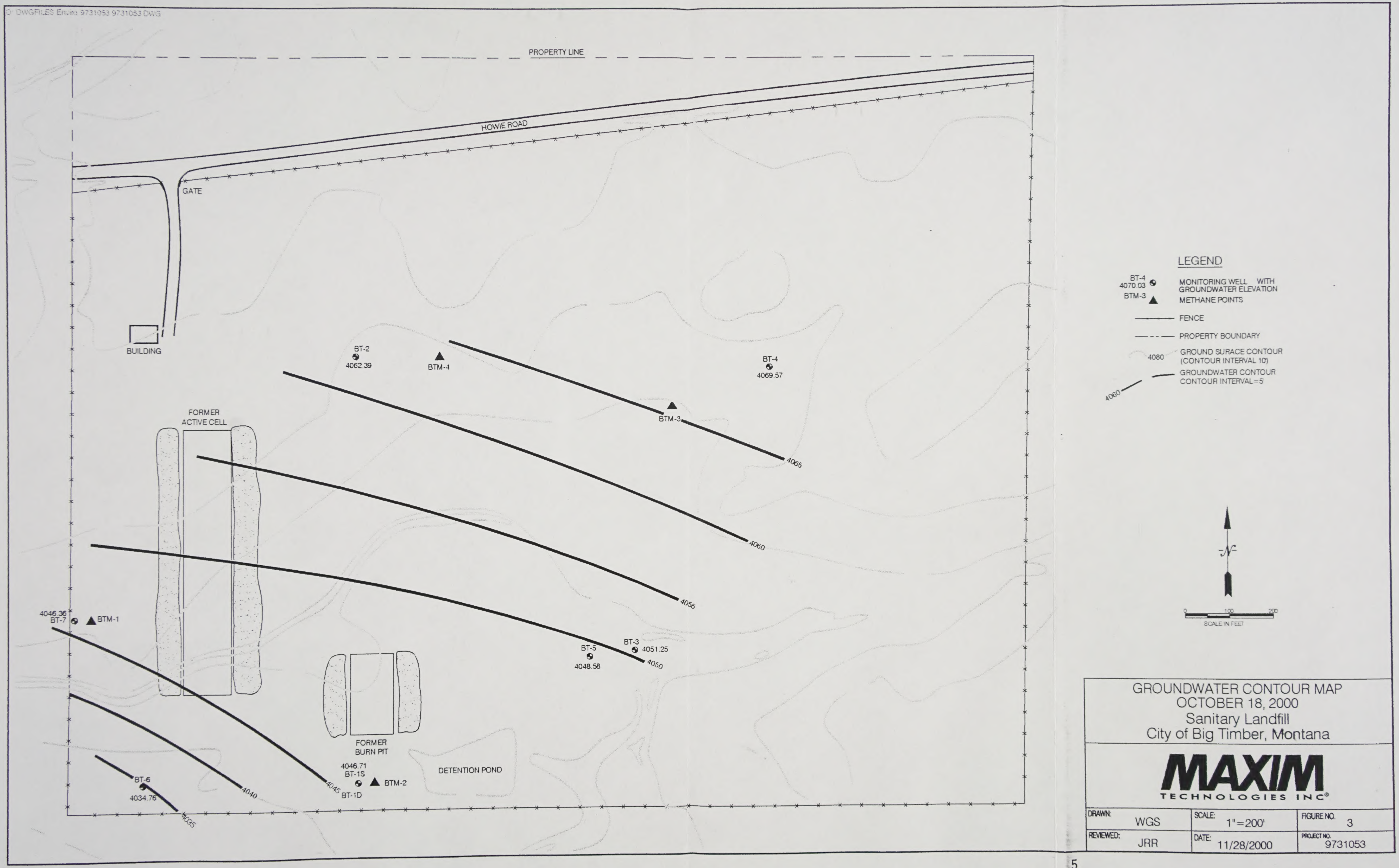
Hydraulic conductivities ranging from 0.31 feet per day (ft/day) to 0.85 ft/day were calculated using data from single well aquifer tests conducted at the site (Chen-Northern, 1990). The effective porosity of the water-bearing sandstone at the site is estimated to range from 5 to 30 percent, based on published values for sedimentary rocks with similar textures (Freeze and Cherry, 1979). Based on the measured gradients, the groundwater velocity calculated using Darcy's Law (Freeze and Cherry, 1979) is expected to range from 0.03 to 0.68 ft/day at the site. Groundwater velocity calculations are contained in Appendix B.


D:\DWGFILES\Enviro\9731053\9731053.DWG
GATE
BUILDING
FORMER ACTIVE CELL
4046.36 BT-7
BTM-1
BT-6 4034.76
4040
4035
LEGEND
BT-4 4070.03 MONITORING WELL WITH GROUNDWATER ELEVATION
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10)
4060 GROUNDWATER CONTOUR CONTOUR INTERVAL=5'
N
0 100 200
SCALE IN FEET

GROUNDWATER CONTOUR MAP
OCTOBER 18, 2000
Sanitary Landfill
City of Big Timber, Montana

MAXIM TECHNOLOGIES INC®

| | | |
|---|---|---|
| DRAWN: WGS | SCALE: 1"=200' | FIGURE NO. 3 |
| REVIEWED: JRR | DATE: 11/28/2000 | PROJECT NO. 9731053 |


D: DWGFILES Enviro 9731053 9731053 DWG
PROPERTY LINE
HOWIE ROAD
GATE
BUILDING
BT-2
4062.39
BTM-4
BT-4
4069.57
BTM-3
4065
FORMER
ACTIVE CELL
4060
4055
4046.36
BT-7
BTM-1
BT-5
4048.58
BT-3
4051.25
4050
FORMER
BURN PIT
4046.71
BT-1S
BTM-2
BT-1D
DETENTION POND
BT-6
4034.76
4035
4040
4045
LEGEND
BT-4
4070.03
MONITORING WELL WITH GROUNDWATER ELEVATION
BTM-3
METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080
GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
4060
GROUNDWATER CONTOUR CONTOUR INTERVAL=5'
N
0
100
200
SCALE IN FEET

GROUNDWATER CONTOUR MAP
OCTOBER 18, 2000
Sanitary Landfill
City of Big Timber, Montana

MAXIM
TECHNOLOGIES INC®

| | | |
|---|---|---|
| DRAWN: WGS | SCALE: 1"=200' | FIGURE NO. 3 |
| REVIEWED: JRR | DATE: 11/28/2000 | PROJECT NO. 9731053 |

## 3.2 GROUNDWATER QUALITY

Groundwater samples were collected from monitoring wells BT-1S, BT-2, BT-6, and BT-7 on October 18, 2000. Copies of groundwater sampling logs from this monitoring event are contained in Appendix C. Laboratory analytical results and chain of custody forms for groundwater samples collected at the landfill during this sampling event are presented in Appendix D.

### 3.2.1 Inorganic Water Quality

Of the inorganic parameters analyzed, chemical oxygen demand (COD), chloride, electrical conductivity (EC), iron, nitrate and sulfate were detected with concentrations above their respective laboratory practical quantitation limits (PQLs) during this monitoring event. Concentrations of these parameters were all below groundwater protection standards as described in ARM 17.50.710(5).

### 3.2.2 Organic Water Quality

Concentrations of volatile organic compounds (VOCs) were below their respective PQLs in all water samples collected at the landfill during this monitoring event.

## 4.0 DATA VALIDATION

This section describes the data validation process used to determine the adequacy and quality of laboratory analytical data collected at the Big Timber Sanitary Landfill. The objective of data validation is to identify any unreliable or invalid laboratory measurements and qualify those data for interpretive use.

## 4.1 FIELD QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

A field duplicate sample (BT-101S) was collected during this monitoring event from monitoring well BT-1S. A trip blank was also submitted to the laboratory. This trip blank consisted of deionized water which was prepared and containerized by laboratory personnel and transported to the landfill prior to laboratory submittal. Laboratory analytical reports for these samples are presented in Appendix D.

The field duplicate sample was analyzed for inorganic parameters and VOCs. The trip blank was analyzed for VOCs only. No VOCs were detected at concentrations above the PQLs in the trip blank.

Analytical results for the original and duplicate samples collected from monitoring well BT-1S were evaluated by calculating the relative percent difference (RPD) between the two samples for those parameters with concentrations greater than five times the PQL. If the RPD for a pair of samples is greater than 20%, the values are considered to be estimated. The absolute value difference (AVD) between the two samples was calculated when one or both values for a given parameter were less than five times the PQL. If the AVD for a pair of samples is greater than the PQL, the values are considered to be estimated. In the event one of the quality assurance and quality control (QA/QC) sample results is less than the PQL, the PQL is used to represent the concentration of the parameter in that sample. These procedures are recommended in United States Environmental Protection Agency (EPA) data validation guidelines (EPA, 1988).

Calculated RPDs for chloride, sulfate, electrical conductivity, and pH were less than 20 percent and are therefore valid values. The concentrations of nitrate and nitrite detected in the QA/QC samples exhibited a RPD of 45 percent, and therefore, is considered an estimated value.

Iron (Fe) was detected in sample BT-1S at a concentration of 0.33 milligrams per liter (mg/l). However, iron was not detected above the 0.05 mg/l PQL for field duplicate sample BT-101S. The calculated AVD for iron in these samples was 0.28 mg/l, which is greater than five times the PQL. Therefore, the iron concentrations are considered estimated.

The chemical oxygen demand concentration was below the PQL of 0.5 mg/l in sample BT-1S and 0.7 mg/l in the field duplicate sample. The calculated AVD for COD was less than or equal to the PQL. Therefore, the concentration of COD in the QA/QC samples are considered valid.

## 4.2 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Groundwater samples from the Big Timber Sanitary Landfill were received at Maxim's analytical laboratory on October 18, 2000. Chain of custody documents accompanied the samples from sample collection to receipt at the laboratory. The water sample collected from monitoring well BT-1S was split to obtain matrix spike and matrix spike duplicate samples. A review of laboratory quality assurance/quality control procedures indicates that the reported analytical results are valid.

## 5.0 LIMITATIONS

This work was performed in accordance with the generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Maxim observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Maxim's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgement concerning the significance of the data gathered during the course of the monitoring. Other than this, no warranty is implied or intended.

| | |
|---|---|
| Prepared by: | Reviewed by: |
| Patrick J. Thomson<br>Environmental Scientist | Jeffrey R. Rice<br>Environmental Group Manager |

## 6.0 REFERENCES CITED

Chen-Northern, 1990, Hydrogeologic Investigation Report, Proposed Big Timber Landfill Site, Big Timber, Montana, report submitted to the City of Big Timber, January.

Freeze and Cherry, 1979, Groundwater, Prentice-Hall, Inc., Englewood Cliffs, NJ.

Maxim, 1995, Groundwater Monitoring Sampling and Analysis Plan, City of Big Timber Sanitary Landfill, Big Timber, Montana, report submitted to the City of Big Timber, April.

Montana Department of Environmental Quality, 1995, Administrative Rules of Montana , Title 75 Sub-Chapter 7 – Groundwater Monitoring.

United States Environmental Protection Agency, 1988, Laboratory Data Validation; Functional Guidelines for Evaluating Inorganic Analyses, prepared by Viar & Co.

# APPENDIX A
# Groundwater Elevation Data

**GROUNDWATER ELEVATION MEASUREMENTS**
**BIG TIMBER SANITARY LANDFILL**
**BIG TIMBER, MONTANA**
**MAXIM PROJECT NO. 9731053-100**

ALL MEASUREMENTS IN FEET

WELL NO. BT-1S
REFERENCE ELEVATION: 4067.78
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.42 | 4049.36 | | |
| 07/19/90 | 19.08 | 4048.70 | -0.66 | |
| 10/04/94 | 17.06 | 4050.72 | 2.02 | |
| 01/30/95 | 17.92 | 4049.86 | -0.86 | |
| 02/27/95 | 14.87 | 4052.91 | 3.05 | |
| 03/27/95 | 15.13 | 4052.65 | -0.26 | |
| 04/28/95 | 15.98 | 4051.80 | -0.85 | |
| 05/26/95 | 15.17 | 4052.61 | 0.81 | |
| 06/30/95 | 15.50 | 4052.28 | -0.33 | |
| 07/31/95 | 15.92 | 4051.86 | -0.42 | |
| 08/22/95 | 16.25 | 4051.53 | -0.33 | |
| 09/30/95 | 16.83 | 4050.95 | -0.58 | |
| 10/31/95 | 17.33 | 4050.45 | -0.50 | |
| 11/28/95 | 17.33 | 4050.45 | 0.00 | |
| 12/26/95 | 17.50 | 4050.28 | -0.17 | Well Resurveyed; New Elevation = 4067.67 |
| 01/16/96 | 17.51 | 4050.27 | -0.01 | |
| 10/08/96 | 16.67 | 4051.00 | 0.73 | |
| 04/29/97 | 16.00 | 4051.67 | 0.67 | |
| 12/10/97 | 15.71 | 4051.96 | 0.29 | |
| 11/19/98 | 17.64 | 4050.03 | -1.93 | |
| 05/06/99 | 18.15 | 4049.52 | -0.51 | |
| 10/20/99 | 19.54 | 4048.13 | -1.39 | |
| 04/25/00 | 20.47 | 4047.20 | -0.93 | |
| 10/18/00 | 20.96 | 4046.71 | -0.49 | |

WELL NO. BT-1D
REFERENCE ELEVATION: 4067.78
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.36 | 4049.42 | | |
| 07/19/90 | 19.23 | 4048.55 | -0.87 | |
| 10/04/94 | 17.30 | 4050.48 | 1.93 | |
| 01/30/95 | 17.83 | 4049.95 | -0.53 | |
| 02/27/95 | 15.37 | 4052.41 | 2.46 | |
| 03/27/95 | 15.29 | 4052.49 | 0.08 | |
| 04/28/95 | 17.60 | 4050.18 | -2.31 | |
| 05/26/95 | 17.50 | 4050.28 | 0.10 | |
| 06/30/95 | 17.08 | 4050.70 | 0.42 | |
| 07/31/95 | 16.66 | 4051.12 | 0.42 | |
| 08/22/95 | 17.16 | 4050.62 | -0.50 | |
| 09/30/95 | 17.25 | 4050.53 | -0.09 | |
| 10/31/95 | 17.92 | 4049.86 | -0.67 | |
| 11/28/95 | 17.33 | 4050.45 | 0.59 | |
| 12/26/95 | 17.58 | 4050.20 | -0.25 | Well Resurveyed; New Elevation = 4067.43 |
| 01/16/96 | 17.38 | 4050.40 | 0.20 | |
| 10/08/96 | 16.58 | 4050.85 | 0.45 | |
| 04/29/97 | NM | NM | NM | |
| 12/10/97 | 15.85 | 4051.58 | 0.73 | |
| 11/19/98 | 18.07 | 4049.36 | -2.22 | |
| 05/06/99 | 18.85 | 4048.58 | -0.78 | |
| 10/20/99 | 19.28 | 4048.15 | -0.43 | |
| 04/25/00 | 19.75 | 4047.68 | -0.47 | |
| 10/18/00 | 19.77 | 4047.66 | -0.02 | |

WELL NO. BT-2
REFERENCE ELEVATION: 4090.55
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 23.64 | 4066.91 | | |
| 07/19/90 | 27.29 | 4063.26 | -3.65 | |
| 10/04/94 | 26.34 | 4064.21 | 0.95 | |
| 01/30/95 | 23.71 | 4066.84 | 2.63 | |
| 02/27/95 | 23.50 | 4067.05 | 0.21 | |
| 03/27/95 | 23.33 | 4067.22 | 0.17 | |
| 04/28/95 | 25.03 | 4065.52 | -1.70 | |
| 05/26/95 | 24.42 | 4066.13 | 0.61 | |
| 06/30/95 | 24.50 | 4066.05 | -0.08 | |
| 07/31/95 | 25.00 | 4065.55 | -0.50 | |
| 08/22/95 | 25.00 | 4065.55 | 0.00 | |
| 09/30/95 | 25.16 | 4065.39 | -0.16 | |
| 10/31/95 | 25.42 | 4065.13 | -0.26 | |
| 11/28/95 | 25.58 | 4064.97 | -0.16 | |
| 12/26/95 | 25.83 | 4064.72 | -0.25 | Well Resurveyed; New Elevation = 4090.35 |
| 01/16/96 | 25.61 | 4064.74 | 0.02 | |
| 10/08/96 | 25.40 | 4064.95 | 0.21 | |
| 04/29/97 | 25.34 | 4065.01 | 0.06 | |
| 12/10/97 | 25.46 | 4064.89 | -0.12 | |
| 11/19/98 | 26.58 | 4063.77 | -1.12 | |
| 05/06/99 | 27.02 | 4063.33 | -0.44 | |
| 10/20/99 | 27.37 | 4062.98 | -0.35 | |
| 04/25/00 | 27.78 | 4062.57 | -0.41 | |
| 10/18/00 | 27.96 | 4062.39 | -0.18 | |

WELL NO. BT-3
REFERENCE ELEVATION: 4069.31
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 14.67 | 4054.64 | | |
| 07/19/90 | 15.70 | 4053.61 | -1.03 | |
| 10/04/94 | 13.68 | 4055.63 | 2.02 | |
| 01/30/95 | 12.66 | 4056.65 | 1.02 | |
| 02/27/95 | 12.04 | 4057.27 | 0.62 | |
| 03/27/95 | 12.33 | 4056.98 | -0.29 | |
| 04/28/95 | 12.94 | 4056.37 | -0.61 | |
| 05/26/95 | 12.79 | 4056.52 | 0.15 | |
| 06/30/95 | 11.83 | 4057.48 | 0.96 | |
| 07/31/95 | 12.16 | 4057.15 | -0.33 | |
| 08/22/95 | 12.42 | 4056.89 | -0.26 | |
| 09/30/95 | 12.75 | 4056.56 | -0.33 | |
| 10/31/95 | 12.92 | 4056.39 | -0.17 | |
| 11/28/95 | 13.00 | 4056.31 | -0.08 | |
| 12/26/95 | 13.08 | 4056.23 | -0.08 | Well Resurveyed; New Elevation = 4069.12 |
| 01/16/96 | 13.06 | 4056.25 | 0.02 | |
| 10/08/96 | 12.40 | 4056.72 | 0.47 | |
| 04/29/97 | 11.23 | 4057.89 | 1.17 | |
| 12/10/97 | 10.65 | 4058.47 | 0.58 | |
| 11/19/98 | 14.69 | 4054.43 | -4.04 | |
| 05/06/99 | 15.54 | 4053.58 | -0.85 | |
| 10/20/99 | 16.62 | 4052.50 | -1.08 | |
| 04/25/00 | 17.60 | 4051.52 | -0.98 | |
| 10/18/00 | 17.87 | 4051.25 | -0.27 | |

WELL NO. BT-4
REFERENCE ELEVATION: 4087.64
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 16.62 | 4071.02 | | |
| 07/19/90 | 16.79 | 4070.85 | -0.17 | |
| 10/04/94 | 15.71 | 4071.93 | 1.08 | |
| 01/30/95 | 14.66 | 4072.98 | 1.05 | |
| 02/27/95 | 13.71 | 4073.93 | 0.95 | |
| 03/27/95 | 13.96 | 4073.68 | -0.25 | |
| 04/28/95 | 15.30 | 4072.34 | -1.34 | |
| 05/26/95 | 14.42 | 4073.22 | 0.88 | |
| 06/30/95 | 15.00 | 4072.64 | -0.58 | |
| 07/31/95 | 14.58 | 4073.06 | 0.42 | |
| 08/22/95 | 15.58 | 4072.06 | -1.00 | |
| 09/30/95 | 15.16 | 4072.48 | 0.42 | |
| 10/31/95 | 15.92 | 4071.72 | -0.76 | |
| 11/28/95 | 16.00 | 4071.64 | -0.08 | |
| 12/26/95 | 16.17 | 4071.47 | -0.17 | Well Resurveyed; New Elevation = 4087.45 |
| 01/16/96 | 16.04 | 4071.60 | 0.13 | |
| 10/08/96 | 15.51 | 4071.94 | 0.34 | |
| 04/29/97 | 15.31 | 4072.14 | 0.20 | |
| 12/10/97 | 15.68 | 4071.77 | -0.37 | |
| 11/19/98 | 16.34 | 4071.11 | -0.66 | |
| 05/06/99 | 16.93 | 4070.52 | -0.59 | |
| 10/20/99 | 17.07 | 4070.38 | -0.14 | |
| 04/25/00 | 17.42 | 4070.03 | -0.35 | |
| 10/18/00 | 17.88 | 4069.57 | -0.46 | |

WELL NO. BT-5
REFERENCE ELEVATION: 4069.25
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 07/19/90 | 18.45 | 4050.80 | | |
| 10/04/94 | 16.04 | 4053.21 | 2.41 | |
| 01/30/95 | 14.00 | 4055.25 | 2.04 | |
| 02/27/95 | 12.08 | 4057.17 | 1.92 | |
| 03/27/95 | 13.75 | 4055.50 | -1.67 | |
| 04/28/95 | 15.25 | 4054.00 | -1.50 | |
| 05/26/95 | 14.83 | 4054.42 | 0.42 | |
| 06/30/65 | 14.58 | 4054.67 | 0.25 | |
| 07/31/95 | 14.50 | 4054.75 | 0.08 | |
| 08/22/95 | 14.83 | 4054.42 | -0.33 | |
| 09/30/95 | 15.25 | 4054.00 | -0.42 | |
| 10/31/95 | 15.42 | 4053.83 | -0.17 | |
| 11/28/95 | 15.42 | 4053.83 | 0.00 | |
| 12/26/95 | 15.58 | 4053.67 | -0.16 | Well Resurveyed; New Elevation = 4068.96 |
| 01/16/96 | 15.55 | 4053.70 | 0.03 | |
| 10/08/96 | 14.71 | 4054.25 | 0.55 | |
| 04/29/97 | 13.47 | 4055.49 | 1.24 | |
| 12/10/97 | 12.97 | 4055.99 | 0.50 | |
| 11/19/98 | 16.99 | 4051.97 | -4.02 | |
| 05/06/99 | 17.60 | 4051.36 | -0.61 | |
| 10/20/99 | 18.82 | 4050.14 | -1.22 | |
| 04/25/00 | 19.24 | 4049.72 | -0.42 | |
| 10/18/00 | 20.38 | 4048.58 | -1.14 | |

WELL NO. BT-6
REFERENCE ELEVATION: 4057.57
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 07/19/90 | 22.65 | 4034.92 | | |
| 10/04/94 | 17.88 | 4039.69 | 4.77 | |
| 01/30/95 | 22.83 | 4034.74 | -4.95 | |
| 02/27/95 | 24.46 | 4033.11 | -1.63 | |
| 03/27/95 | 24.92 | 4032.65 | -0.46 | |
| 04/28/95 | 27.25 | 4030.32 | -2.33 | |
| 05/26/95 | 26.92 | 4030.65 | 0.33 | |
| 06/30/95 | 26.08 | 4031.49 | 0.84 | |
| 07/31/95 | 25.58 | 4031.99 | 0.50 | |
| 08/22/95 | 25.92 | 4031.65 | -0.34 | |
| 09/30/95 | 26.00 | 4031.57 | -0.08 | |
| 10/31/95 | 25.75 | 4031.82 | 0.25 | |
| 11/28/95 | 25.92 | 4031.65 | -0.17 | |
| 12/26/95 | 26.75 | 4030.82 | -0.83 | Well Resurveyed; New Elevation = 4057.69 |
| 01/16/96 | 26.91 | 4030.66 | -0.16 | |
| 10/08/96 | 21.60 | 4036.09 | 5.43 | |
| 04/29/97 | 27.21 | 4030.48 | -5.61 | |
| 12/10/97 | 23.79 | 4033.90 | 3.42 | |
| 11/19/98 | 25.53 | 4032.16 | -1.74 | |
| 05/06/99 | 28.37 | 4029.32 | -2.84 | |
| 10/20/99 | 25.52 | 4032.17 | 2.85 | |
| 04/25/00 | 28.82 | 4028.87 | -3.30 | |
| 10/18/00 | 22.93 | 4034.76 | 5.89 | |

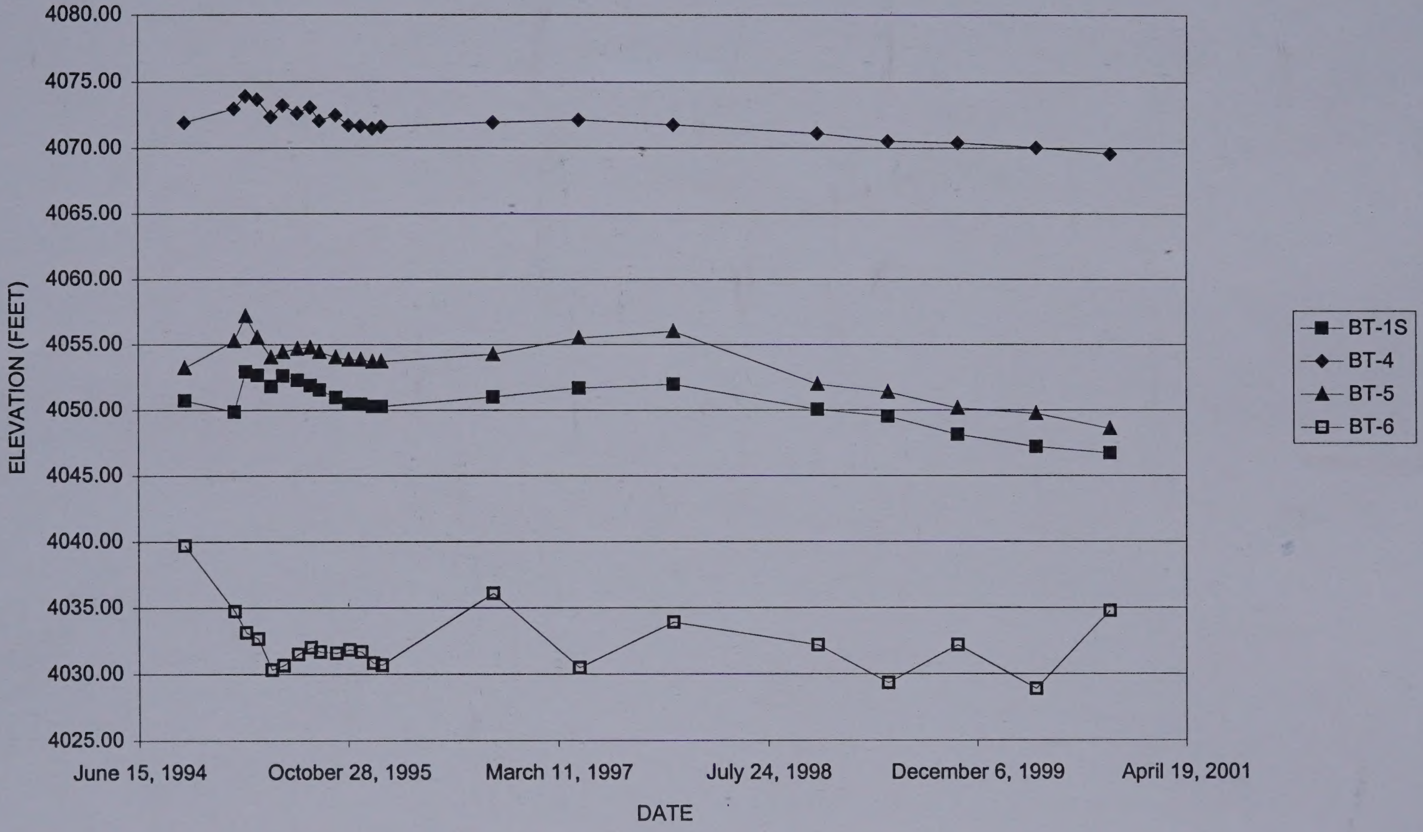
WELL NO. BT-7
REFERENCE ELEVATION: 4085.71
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 12/26/95 | 39.58 | 4046.13 | | |
| 01/16/96 | 38.47 | 4047.24 | 1.11 | |
| 10/08/96 | 38.00 | 4047.71 | 0.47 | |
| 04/29/97 | 38.21 | 4047.50 | -0.21 | |
| 12/10/97 | 38.15 | 4047.56 | 0.06 | |
| 11/19/98 | 39.20 | 4046.51 | -1.05 | |
| 05/06/99 | 39.60 | 4046.11 | -0.40 | |
| 10/20/99 | 39.71 | 4046.00 | -0.11 | |
| 04/25/00 | 39.98 | 4045.73 | -0.27 | |
| 10/18/00 | 39.35 | 4046.36 | 0.63 | |

LEGEND

NM: Not Measured

# HYDROGRAPHS
# MONITORING WELLS BT-1S, BT-4, BT-5, & BT-6



# APPENDIX B
## Groundwater Velocity Calculations

**MAXIM** TECHNOLOGIES INC® BY PAT THOMSON DATE 10-25-00

JOB TITLE BIG TIMBER LANDFILL JOB NUMBER 9731053.

SUBJECT GROUNDWATER VELOCITY CALC'S SHEET 1

$$v = \frac{Ki}{n}$$

$v$ = interstitial velocity
$K$ = hydraulic conductivity
$i$ = gradient
$n$ = effective porosity

$K = 0.31$ TO $0.85$ ft/day (CHEN-NORTHERN, 1990)

$i = 0.027$ TO $0.040$ (Figure 3)

$n = 0.05$ TO $0.30$ (estimate, Freeze & Cherry, 1979)

LOW RANGE

$$v = \frac{(0.31)(0.027)}{0.30} = 0.03 \text{ ft/day}$$

HIGH RANGE

$$v = \frac{(0.85)(0.04)}{0.05} = 0.68 \text{ ft/day}$$

# APPENDIX C
## Groundwater Sampling Logs

# GROUNDWATER SAMPLING LOG

DILLINGS

Project: 9731053.100 Date/Time: 10/18/00 Station No.: BT-15 / BT-1015 (DUPLICATE) 1240

Narrative Description: Big Timber Landfill

Personnel: Connolly Weather: Clear ~65°

Well Locked? Yes [ ] No [ ] Well Log? Yes [ ] No [ ]

Casing Type: PVC Casing Diameter: 2" Casing Stickup: 2.5'

Measuring Point: AS MARKED Depth to Water: 20.96 Total Depth: 37.0'

## WELL EVACUATION

Method: Submersible Pump [ ] PVC Bailer [ ] Disposable Bailer ☒ Other [ ] ______

One casing volume = 2.79 Gallons x 3 = 8.37 Gallons

Remarks: WATER = Clear.

| Time | Cumulative Gallons | Temp. | Ph | SC | Other ORP | D.O. |
|---|---|---|---|---|---|---|
| 1205 | 2 | 10.8 | 8.61 | 397.6 | 110.4~~397.6~~ | 7.21 |
| 1210 | 4 | 10.6 | 8.50 | 394.7 | 127.1 | 7.20 |
| 1215 | 6 | 10.6 | 8.55 | 395.7 | 135.4 | 7.14 |
| 1220 | 8 | 10.6 | 8.58 | 395.8 | 138.4 | 6.97 |
| 1225 | 10 | 10.6 | 8.58 | 397.4 | 138.7 | 6.91 |

## SC DATA

| Water Temp. (1) | Observed SC (μmhos) (2) | Temp. Correction Factor (3) | Cell Factor (4) | SC = (2)x(3)x(4) μmhos/cm @ 25°C |
|---|---|---|---|---|
| 10.6 | 397.7 | | | |

## WELL SAMPLING (1230)

Sampling Method: Disp. Bailer Sample Type: Natural ☒ Duplicate [ ] X-Contam [ ] Trip Blank [ ] Blind Field Sta. [ ]

Temperature: 10.6 pH: 8.58 Other: SC = 397.7 D.O. 6.93 ORP 138.7

| Sample Container | Parameters | Preservative |
|---|---|---|
| 3 - 40mL VOAs. | VOC'S | HCL |
| 250 | Cyanide | Sodium Hydroxide. |
| 250 | NUTRIENTS | Sulfuric |
| 250 | ~~[illegible]~~ METALS | NITRIC |
| 500 | COMMON | None. |

Laboratory: NORTHERN. Chain of Custody: Yes ☒ No [ ]

Sample Analysis Request Form: Yes [ ] No [ ]

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | ORION 230A | 10/18 |
| SC | YSI 30 | 10/18 |
| Water Level | SOLINST | 10/18 |
| D.O. | YSI 50B | 10/18 |
| ORP | HANNA 9023 | |

**Decontamination**

Steam Yes [ ] No ☒ Potable Water: Yes ☒ No [ ]
Scrub: Yes ☒ No [ ] Liquinox: Yes ☒ No [ ]
Methanol: Yes ☒ No [ ] Acetone: Yes [ ] No ☒
Nitic Acid: Yes [ ] No ☒ D.I. $H_20$ Yes ☒ No [ ]

Comments: ______

Revised 8/16/

# GROUNDWATER SAMPLING LOG

BILLINGS

Project: 9731053.100 Date/Time: 10/18/00 Station No.: BT-2

Narrative Description: Big Timber Landfill

Personnel: Connolly Weather: Clear ~ 70°

Well Locked? Yes [ ] No [ ] Well Log? Yes [ ] No [ ]

Casing Type: PVC Casing Diameter: 2" Casing Stickup:

Measuring Point: As Marked Depth to Water: 27.96 Total Depth: 43.0'

## WELL EVACUATION

Method: Submersible Pump [ ] PVC Bailer [ ] Disposable Bailer ☒ Other [ ]

One casing volume = 2.62 Gallons x 3 = 7.85 Gallons

Remarks: Water = first gal. cloudy gray then cleared up.

| Time | Cumulative Gallons | Temp. | Ph | SC | Other ORP. | D.O. |
|---|---|---|---|---|---|---|
| 1300 | 2 | 10.6 | 6.08 | 133.6 | 168.7 | 2.49 |
| 1310 | 4 | 10.6 | 7.40 | 346.8 | 161.4 | 2.85 |
| 1320 | 6 | 10.4 | 7.56 | 346.2 | 164.7 | 2.41 |
| 1330 | 8 | 10.4 | 7.54 | 348.9 | 161.3 | 2.43 |
|  |  |  |  |  |  |  |

## SC DATA

| Water Temp. (1) | Observed SC (µmhos) (2) | Temp. Correction Factor (3) | Cell Factor (4) | SC = (2)x(3)x(4) µmhos/cm @ 25°C |
|---|---|---|---|---|
|  |  |  |  |  |

## WELL SAMPLING

Sampling Method: Disp Bailer Sample Type: Natural ☒ Duplicate [ ] X-Contam [ ] Trip Blank [ ] Blind Field Sta. [ ]

Temperature: pH: Other:

| Sample Container | Parameters | Preservative |
|---|---|---|
| 3 - 40 ML VOAs | VOC'S | HCL |
| 250 | Cyanide | Sodium Hydroxide |
| 250 | Nutrients | Sulfuric |
| 250 | Metals | Nitric |
| 500 | Common | None |

Laboratory: Northern Chain of Custody: Yes ☒ No [ ]

Sample Analysis Request Form: Yes [ ] No [ ]

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | Orion 230A | 10/18 |
| SC | YSI 30 | " |
| Water Level | Solinst | " |
| D.O. | YSI 50B | " |
| ORP | Hanna 9023 | " |

Decontamination

Steam Yes [ ] No ☒ Potable Water: Yes ☒ No [ ]

Scrub: Yes ☒ No [ ] Liquinox: Yes ☒ No [ ]

Methanol: Yes ☒ No [ ] Acetone: Yes [ ] No ☒

Nitic Acid: Yes [ ] No ☒ D.I. $H_20$ Yes ☒ No [ ]

Comments:

Revised 8/161

# GROUNDWATER SAMPLING LOG

BILLINGS

Project: 9731053.100　Date/Time: 10/18/00　Station No.: BT-6

Narrative Description: Big Timber Landfill

Personnel: Connolly　Weather: Clear ~ 70° windy.

Well Locked? Yes ☐ No ☐　Well Log? Yes ☐ No ☐

Casing Type: PVC　Casing Diameter: 2"　Casing Stickup:

Measuring Point: As marked　Depth to Water: 22.93　Total Depth: 32.2'

---

## WELL EVACUATION

Method: Submersible Pump ☐　PVC Bailer ☒　Disposable Bailer ☐　Other ☐

One casing volume = 1.61 Gallons x 3 = 4.84 Gallons

Remarks: Water - First gal. Clear. Then Cloudy

| Time | Cumulative Gallons | Temp. | Ph | SC | Other orp | D.O. |
|---|---|---|---|---|---|---|
| 1120 | 1 | 11.0 | 6.78 | 3774 | 174.3 | 2.68 |
| 1125 | 2 | 10.4 | 7.52 | 390.8 | 175.5 | 2.51 |
| 1130 | 3 | 10.3 | 7.56 | 399.2 | 172.1 | 2.63 |
| 1135 | 4 | 10.3 | 7.59 | 401.5 | 174.9 | 2.56 |
| 1140 | 5 | 10.3 | 7.63 | 405.7 | 174.1 | 2.61 |

## SC DATA

| Water Temp. (1) | Observed SC (µmhos) (2) | Temp. Correction Factor (3) | Cell Factor (4) | SC = (2)x(3)x(4) µmhos/cm @ 25°C |
|---|---|---|---|---|
| | | | | |

---

## WELL SAMPLING 1140

Sampling Method: Disp Bailer　Sample Type: Natural ☒　Duplicate ☐　X-Contam ☐　Trip Blank ☐　Blind Field Sta. ☐

Temperature:　pH:　Other:

| Sample Container | Parameters | Preservative |
|---|---|---|
| 3 - 40mL | VOC's | HCL |
| 250 | Cyanide | Sodium Hydroxide |
| 250 | Nutrients | Sulfuric |
| 250 | Metals | Nitric |
| 500 | Common | None |

Laboratory: Northern　Chain of Custody: Yes ☒ No ☐

Sample Analysis Request Form: Yes ☒ No ☐

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | Orion 230A | 10/18 |
| SC | YSI 30 | " |
| Water Level | Solinst | " |
| D.O. | YSI 50B | " |
| ORP | Hanna 9023 | " |

**Decontamination**

Steam Yes ☐ No ☒　Potable Water: Yes ☒ No ☐
Scrub: Yes ☒ No ☐　Liquinox: Yes ☒ No ☐
Methanol: Yes ☒ No ☐　Acetone: Yes ☐ No ☒
Nitic Acid: Yes ☐ No ☒　D.I. $H_20$ Yes ☒ No ☐

Comments: Very Slow Producer.

Revised 8/161

# GROUNDWATER SAMPLING LOG

BILLINGS

Project: 9731053.100 Date/Time: 10/18/00 Station No.: BT-7

Narrative Description: Big Timber landfill

Personnel: Connolly Weather: Clear ~ 70° windy

Well Locked? Yes ☐ No ☐ Well Log? Yes ☐ No ☐

Casing Type: PVC Casing Diameter: 2" Casing Stickup:

Measuring Point: As marked Depth to Water: 39.35 Total Depth: 49.7'

## WELL EVACUATION

Method: Submersible Pump ☐ PVC Bailer ☐ Disposable Bailer ☒ Other ☐

One casing volume = 1.80 Gallons x 3 = 5.40 Gallons

Remarks: Water = first ½ gal clear then cloudy.

| Time | Cumulative Gallons | Temp. | Ph | SC | Other ORP | D.O. |
|---|---|---|---|---|---|---|
| 1345 | 2 | 11.2 | 7.57 | 945 | 274.9 | 0.78 |
| 1355 | 4 | 11.1 | 7.68 | 942 | 264.5 | 0.64 |
| 1405 | 6 | 11.1 | 7.64 | 941 | 264.1 | 0.51 |
| | | | | | | |
| | | | | | | |

## SC DATA

| Water Temp. (1) | Observed SC (µmhos) (2) | Temp. Correction Factor (3) | Cell Factor (4) | SC = (2)x(3)x(4) µmhos/cm @ 25°C |
|---|---|---|---|---|
| | | | | |

## WELL SAMPLING 1410

Sampling Method: Disp. Bailer Sample Type: Natural ☒ Duplicate ☐ X-Contam ☐ Trip Blank ☐ Blind Field Sta. ☐

Temperature: 11.1 pH: 7.65 Other: ORP = 264.4 D.O. 0.49.

| Sample Container | Parameters | Preservative |
|---|---|---|
| 3-40mL VOAs | VOC's | HCL |
| 250 | Cyanide | Sodium Hydroxide |
| 250 | Nutrients | Sulfuric |
| 250 | Metals | Nitric |
| 500 | Common | None. |

Laboratory: Northern Chain of Custody: Yes ☒ No ☐

Sample Analysis Request Form: Yes ☐ No ☐

| Meter | Serial No. | Calibration Date |
|---|---|---|
| pH | ORION 230A | 10/18 |
| SC | YSI 30 | " |
| Water Level | Solinst | " |
| D.O. | YSI-55B | " |
| ORP | Hanna 5023 | " |

**Decontamination**

Steam Yes ☐ No ☒ Potable Water: Yes ☒ No ☐
Scrub: Yes ☒ No ☐ Liquinox: Yes ☒ No ☐
Methanol: Yes ☒ No ☐ Acetone: Yes ☐ No ☒
Nitic Acid: Yes ☐ No ☒ D.I. $H_20$ Yes ☒ No ☐

Comments:

Revised 8/16/

# APPENDIX D

# Laboratory Analytical Reports and Chain-of-Custody Documents

**NORTHERN**
**Analytical Laboratories, Inc.**

*602 South 25th Street*
*P O Box 30315*
*Billings, MT 59107*
*Telephone: (406) 254-7226*
*Fax: (406) 254-1389*

**REPORT TO:** ATTN: JEFF RICE
MAXIM TECHNOLOGIES, INC.
P O BOX 30615
BILLINGS MT 59107

**DATE:** November 14, 2000
**JOB NUMBER:** 87-910
**SHEET:** 1 of 29
**INVOICE NO.:** 100226

**REPORT OF:** Water Analysis – Big Timber Landfill, Project No. 9731053.100

## CASE NARRATIVE:

On October 19, 2000, these water samples (laboratory numbers 2000100226-1 through -7) were received in our laboratory for analysis. Tests were conducted in accordance with EPA/600/4-79-020 *"Methods for Chemical Analysis of Water and Wastes," "Standard Methods for the Examination of Water and Wastewater,"* 18th Edition, and SW-846 *"Test Methods for Evaluating Solid Waste,"* 3rd Edition, updates I, II, IIA, IIB, III.

The condition of the samples upon receipt at the laboratory is noted on the attached sample receipt checklist. Chain of custody documentation is enclosed.

The results of the analysis are shown on the following pages.

A <sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable.

**Footnote:**

(1) The recovery is outside the stated control limits. The associated lab control sample met the quality control requirements. No corrective action was necessary.

Reviewed by Denise Jensen
Denise Jensen – Quality Assurance Coordinator

Attachments: Chain of Custody
Sample Receipt Checklist

caj

As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of our clients and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. Test results apply specifically to the samples tested only. The entire report shall not be reproduced, except in full, without the written approval of the laboratory. Samples will be disposed of after testing is completed unless other arrangements are agreed to in writing.

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-1 **Description:** BT-1S
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 1026001015 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 10/26/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromoform | <1 | ug/l | 8260B | 10/26/2000 |
| Bromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 10/26/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroform | <1 | ug/l | 8260B | 10/26/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**ample No.:** 2000100226-1 **Description:** BT-1S

**ate Received:** 10/19/2000

**ate Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| **Laboratory Test** | **Measured Value** | **Test Units** | **Test Method** | **Date of Analysis** |
|---|---|---|---|---|
| tyrene | <1 | ug/l | 8260B | 10/26/2000 |
| ,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| ,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| etrachloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| oluene | <1 | ug/l | 8260B | 10/26/2000 |
| ,1,1-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| ,1,2-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| richloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| richlorofluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| ,2,3-Trichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| inyl chloride | <1 | ug/l | 8260B | 10/26/2000 |
| otal Xylenes | <2 | ug/l | 8260B | 10/26/2000 |
| crylonitrile | <10 | ug/l | 8260B | 10/26/2000 |
| arbon disulfide | <5 | ug/l | 8260B | 10/26/2000 |
| odomethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/26/2000 |
| -1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/26/2000 |
| inyl acetate | <10 | ug/l | 8260B | 10/26/2000 |
| cetone | <20 | ug/l | 8260B | 10/26/2000 |
| ethyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/26/2000 |
| -Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| -Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| ,2-Dichloroethane-d4 (Surrogate) | 105 | % [75-113] | 8260B | 10/26/2000 |
| oluene-d8 (Surrogate) | 98 | % [85-109] | 8260B | 10/26/2000 |
| -Bromofluorobenzene (Surrogate) | 99 | % [90-114] | 8260B | 10/26/2000 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| hloride as Cl | 51 | mg/l | 325.3 | 10/25/2000 |
| ulfate as SO4 | 125 | mg/l | 9036 | 10/30/2000 |
| hemical Oxygen Demand | <5 | mg/l | 410.2 | 10/25/2000 |
| yanide as CN (Total) | <0.005 | mg/l | 4500CNCMOD | 10/23/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-1 **Description:** BT-1S
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 538 | umhos/cm | 9050A | 10/27/2000 |
| pH | 8.6 | S.U. | 9040B | 10/19/2000 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 11/06/2000 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 11/07/2000 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 11/10/2000 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 11/06/2000 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 11/06/2000 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 11/06/2000 |
| Copper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 11/10/2000 |
| Iron as Fe (Dissolved) | 0.33 | mg/l | 6010B | 11/06/2000 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 11/07/2000 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 11/09/2000 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 11/10/2000 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 11/10/2000 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 11/10/2000 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 11/06/2000 |
| Zinc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 11/06/2000 |
| ICP/AA Digestion Date | NA | ----- | | |
| ICP-MS Digestion Date | NA | ----- | | |
| Mercury Digestion Date | ----- | ----- | 7470A | 11/08/2000 |
| Nitrate + Nitrite as N | 1.13 | mg/l | 353.2 | 10/26/2000 |

# orthern Analytical Laboratories, Inc.

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**ample No.:** 2000100226-2 **Description:** BT-2
**ate Received:** 10/19/2000
**ate Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| aboratory est | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **ONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| ta File Number-Volatiles | 1026001016 | ----- | | |
| nzene | <1 | ug/l | 8260B | 10/26/2000 |
| omochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| omodichloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| omoform | <1 | ug/l | 8260B | 10/26/2000 |
| omomethane | <1 | ug/l | 8260B | 10/26/2000 |
| rbon tetrachloride | <1 | ug/l | 8260B | 10/26/2000 |
| lorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| loroethane | <1 | ug/l | 8260B | 10/26/2000 |
| loroform | <1 | ug/l | 8260B | 10/26/2000 |
| loromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/26/2000 |
| bromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/26/2000 |
| 2-Dibromoethane | <1 | ug/l | 8260B | 10/26/2000 |
| bromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| chlorodifluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 2-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 4-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 2-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| -Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| ,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| ,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| 2-Dichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| ,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| ,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| hylbenzene | <1 | ug/l | 8260B | 10/26/2000 |
| thylene chloride | <5 | ug/l | 8260B | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-2 **Description:** BT-2

**Date Received:** 10/19/2000

**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Toluene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 10/26/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 10/26/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 10/26/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 10/26/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/26/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/26/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 10/26/2000 |
| Acetone | <20 | ug/l | 8260B | 10/26/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/26/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 95 | % [75-113] | 8260B | 10/26/2000 |
| Toluene-d8 (Surrogate) | 100 | % [85-109] | 8260B | 10/26/2000 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % [90-114] | 8260B | 10/26/2000 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 24 | mg/l | 325.3 | 10/25/2000 |
| Sulfate as SO4 | 142 | mg/l | 9036 | 10/30/2000 |
| Chemical Oxygen Demand | 14 | mg/l | 410.2 | 10/25/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNCMOD | 10/23/2000 |

# Northern Analytical Laboratories, Inc.

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-2 **Description:** BT-2

**Date Received:** 10/19/2000

**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 471 | umhos/cm | 9050A | 10/27/2000 |
| pH | 8.5 | S.U. | 9040B | 10/19/2000 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 11/06/2000 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 11/06/2000 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 11/06/2000 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 11/06/2000 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 11/06/2000 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 11/06/2000 |
| Copper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 11/10/2000 |
| ron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 11/06/2000 |
| ead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 11/07/2000 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 11/09/2000 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 11/06/2000 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 11/10/2000 |
| hallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 11/10/2000 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 11/06/2000 |
| inc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 11/06/2000 |
| CP/AA Digestion Date | NA | ---- | | |
| CP-MS Digestion Date | NA | ---- | | |
| Mercury Digestion Date | ---- | ---- | 7470A | 11/08/2000 |
| Nitrate + Nitrite as N | 0.06 | mg/l | 353.2 | 10/25/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-3 **Description:** BT-6
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 1026001017 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 10/26/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromoform | <1 | ug/l | 8260B | 10/26/2000 |
| Bromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 10/26/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroform | <1 | ug/l | 8260B | 10/26/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-3 **Description:** BT-6
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Toluene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 10/26/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 10/26/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 10/26/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 10/26/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/26/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/26/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 10/26/2000 |
| Acetone | <20 | ug/l | 8260B | 10/26/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/26/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 85 | % [75-113] | 8260B | 10/26/2000 |
| Toluene-d8 (Surrogate) | 109 | % [85-109] | 8260B | 10/26/2000 |
| 4-Bromofluorobenzene (Surrogate) | 95 | % [90-114] | 8260B | 10/26/2000 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 57 | mg/l | 325.3 | 10/25/2000 |
| Sulfate as SO4 | 114 | mg/l | 9036 | 10/30/2000 |
| Chemical Oxygen Demand | 40 | mg/l | 410.2 | 10/25/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNCMOD | 10/23/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-3 **Description:** BT-6
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 548 | umhos/cm | 9050A | 10/27/2000 |
| pH | 8.5 | S.U. | 9040B | 10/19/2000 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 11/06/2000 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 11/07/2000 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 11/06/2000 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 11/06/2000 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 11/06/2000 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 11/06/2000 |
| Copper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 11/10/2000 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 11/06/2000 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 11/07/2000 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 11/09/2000 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 11/10/2000 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 11/10/2000 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 11/10/2000 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 11/06/2000 |
| Zinc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 11/06/2000 |
| ICP/AA Digestion Date | NA | ----- | | |
| ICP-MS Digestion Date | NA | ----- | | |
| Mercury Digestion Date | ----- | ----- | 7470A | 11/08/2000 |
| Nitrate + Nitrite as N | 0.14 | mg/l | 353.2 | 10/25/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-4 **Description:** BT-7
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 1026001018 | ---- | | |
| Benzene | <1 | ug/l | 8260B | 10/26/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromoform | <1 | ug/l | 8260B | 10/26/2000 |
| Bromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 10/26/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroform | <1 | ug/l | 8260B | 10/26/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-4 **Description:** BT-7

**Date Received:** 10/19/2000

**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Toluene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 10/26/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 10/26/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 10/26/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 10/26/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/26/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/26/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 10/26/2000 |
| Acetone | <20 | ug/l | 8260B | 10/26/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/26/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 97 | % [75-113] | 8260B | 10/26/2000 |
| Toluene-d8 (Surrogate) | 98 | % [85-109] | 8260B | 10/26/2000 |
| 4-Bromofluorobenzene (Surrogate) | 95 | % [90-114] | 8260B | 10/26/2000 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 169 | mg/l | 325.3 | 10/25/2000 |
| Sulfate as SO4 | 225 | mg/l | 9036 | 10/30/2000 |
| Chemical Oxygen Demand | 12 | mg/l | 410.2 | 10/25/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNCMOD | 10/23/2000 |

**orthern Analytical Laboratories, Inc.**

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**ample No.:** 2000100226-4 **Description:** BT-7
**ate Received:** 10/19/2000
**ate Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| **Laboratory Test** | **Measured Value** | **Test Units** | **Test Method** | **Date of Analysis** |
|---|---|---|---|---|
| lectrical Conductivity | 1220 ✓ | umhos/cm | 9050A | 10/27/2000 |
| H | 7.7 ✓ | S.U. | 9040B | 10/19/2000 |
| ntimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 11/06/2000 |
| rsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 11/06/2000 |
| arium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| eryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 11/06/2000 |
| admium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 11/06/2000 |
| hromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 11/06/2000 |
| obalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 11/06/2000 |
| opper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 11/10/2000 |
| on as Fe (Dissolved) | <0.05 | mg/l | 6010B | 11/06/2000 |
| ead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 11/07/2000 |
| ercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 11/09/2000 |
| ickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| elenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 11/06/2000 |
| ilver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 11/10/2000 |
| hallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 11/10/2000 |
| anadium as V (Dissolved) | <0.05 | mg/l | 6020 | 11/06/2000 |
| inc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 11/06/2000 |
| CP/AA Digestion Date | NA | ---- | | |
| CP-MS Digestion Date | NA | ---- | | |
| ercury Digestion Date | ----- | ---- | 7470A | 11/08/2000 |
| itrate + Nitrite as N | <0.05 ✓ | mg/l | 353.2 | 10/25/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-5 **Description:** BT-101S
dupli for BT-1S
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 1026001019 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 10/26/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromoform | <1 | ug/l | 8260B | 10/26/2000 |
| Bromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 10/26/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroform | <1 | ug/l | 8260B | 10/26/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 10/26/2000 |

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**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-5 **Description:** BT-101S

**Date Received:** 10/19/2000

**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Toluene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 10/26/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 10/26/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 10/26/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 10/26/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/26/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/26/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 10/26/2000 |
| Acetone | <20 | ug/l | 8260B | 10/26/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/26/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 91 | % [75-113] | 8260B | 10/26/2000 |
| Toluene-d8 (Surrogate) | 103 | % [85-109] | 8260B | 10/26/2000 |
| 4-Bromofluorobenzene (Surrogate) | 100 | % [90-114] | 8260B | 10/26/2000 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 61 | mg/l | 325.3 | 10/25/2000 |
| Sulfate as SO4 | 142 | mg/l | 9036 | 10/30/2000 |
| Chemical Oxygen Demand | 7 | mg/l | 410.2 | 10/25/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNCMOD | 10/23/2000 |

**Northern Analytical Laboratories, Inc.**

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-5 **Description:** BT-101S dupli for BT-15
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 583 | umhos/cm | 9050A | 10/27/2000 |
| pH | 8.7 | S.U. | 9040B | 10/19/2000 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 11/06/2000 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 11/07/2000 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 11/10/2000 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 11/06/2000 |
| Chromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 11/07/2000 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 11/10/2000 |
| Copper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 11/10/2000 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 11/06/2000 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 11/07/2000 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 11/09/2000 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 11/07/2000 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 11/10/2000 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 11/10/2000 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 11/10/2000 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 11/07/2000 |
| Zinc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 11/06/2000 |
| ICP/AA Digestion Date | NA | ----- | | |
| ICP-MS Digestion Date | NA | ----- | | |
| Mercury Digestion Date | ----- | ----- | 7470A | 11/08/2000 |
| Nitrate + Nitrite as N | 0.62 | mg/l | 353.2 | 10/26/2000 |

**Northern Analytical Laboratories, Inc.**

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-6 **Description:** FIELD BLANK
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 1026001020 | ---- | | |
| Benzene | <1 | ug/l | 8260B | 10/26/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromoform | <1 | ug/l | 8260B | 10/26/2000 |
| Bromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 10/26/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroform | <1 | ug/l | 8260B | 10/26/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| -1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| -1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-6 **Description:** FIELD BLANK

**Date Received:** 10/19/2000

**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Toluene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 10/26/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 10/26/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 10/26/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 10/26/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/26/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/26/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 10/26/2000 |
| Acetone | <20 | ug/l | 8260B | 10/26/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/26/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 87 | % [75-113] | 8260B | 10/26/2000 |
| Toluene-d8 (Surrogate) | 103 | % [85-109] | 8260B | 10/26/2000 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % [90-114] | 8260B | 10/26/2000 |

## Northern Analytical Laboratories, Inc.

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-7 **Description:** TRIP BLANK
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 1026001021 | ---- | | |
| Benzene | <1 | ug/l | 8260B | 10/26/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| Bromoform | <1 | ug/l | 8260B | 10/26/2000 |
| Bromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 10/26/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Chloroform | <1 | ug/l | 8260B | 10/26/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 10/26/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 10/26/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-7 **Description:** TRIP BLANK
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Toluene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 10/26/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 10/26/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 10/26/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 10/26/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/26/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/26/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 10/26/2000 |
| Acetone | <20 | ug/l | 8260B | 10/26/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/26/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 93 | % [75-113] | 8260B | 10/26/2000 |
| Toluene-d8 (Surrogate) | 96 | % [85-109] | 8260B | 10/26/2000 |
| 4-Bromofluorobenzene (Surrogate) | 98 | % [90-114] | 8260B | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**ample No.:** 2000100226-8 **Description:** MATRIX SPIKE OF #1; BT-1S

**ate Received:** 10/19/2000

**ate Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| ata File Number-Volatiles | 1027001008 | ---- | | |
| enzene | 94 | % [72-104] | 8260B | 10/27/2000 |
| romochloromethane | <1 | ug/l | 8260B | 10/27/2000 |
| romodichloromethane | <1 | ug/l | 8260B | 10/27/2000 |
| romoform | <1 | ug/l | 8260B | 10/27/2000 |
| romomethane | <1 | ug/l | 8260B | 10/27/2000 |
| arbon tetrachloride | <1 | ug/l | 8260B | 10/27/2000 |
| hlorobenzene | 100 | % [78-110] | 8260B | 10/27/2000 |
| hloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| hloroform | <1 | ug/l | 8260B | 10/27/2000 |
| hloromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/27/2000 |
| ibromochloromethane | <1 | ug/l | 8260B | 10/27/2000 |
| ,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/27/2000 |
| ,2-Dibromoethane | <1 | ug/l | 8260B | 10/27/2000 |
| ibromomethane | <1 | ug/l | 8260B | 10/27/2000 |
| ichlorodifluoromethane | <1 | ug/l | 8260B | 10/27/2000 |
| 2-Dichlorobenzene | <1 | ug/l | 8260B | 10/27/2000 |
| 4-Dichlorobenzene | <1 | ug/l | 8260B | 10/27/2000 |
| 1-Dichloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| 2-Dichloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1-Dichloroethene | 99 | % [62-106] | 8260B | 10/27/2000 |
| 1,2-Dichloroethene | <1 | ug/l | 8260B | 10/27/2000 |
| 1,2-Dichloroethene | <1 | ug/l | 8260B | 10/27/2000 |
| 2-Dichloropropane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,3-Dichloropropene | <1 | ug/l | 8260B | 10/27/2000 |
| 1,3-Dichloropropene | <1 | ug/l | 8260B | 10/27/2000 |
| hylbenzene | <1 | ug/l | 8260B | 10/27/2000 |
| ethylene chloride | <5 | ug/l | 8260B | 10/27/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-8 **Description:** MATRIX SPIKE OF #1; BT-1S
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 10/27/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 10/27/2000 |
| Toluene | 97 | % [79-107] | 8260B | 10/27/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| Trichloroethene | 95 | % [78-106] | 8260B | 10/27/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 10/27/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 10/27/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 10/27/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 10/27/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 10/27/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/27/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/27/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 10/27/2000 |
| Acetone | <20 | ug/l | 8260B | 10/27/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/27/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/27/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/27/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 90 | % [75-113] | 8260B | 10/27/2000 |
| Toluene-d8 (Surrogate) | 97 | % [85-109] | 8260B | 10/27/2000 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % [90-114] | 8260B | 10/27/2000 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | 98 | % [84-113] | 325.3 | 10/25/2000 |
| Sulfate as SO4 | 101 | % [89-113] | 9036 | 10/30/2000 |
| Chemical Oxygen Demand | 105 | % [90-111] | 410.2 | 10/25/2000 |
| Cyanide as CN (Total) | 92 | % [61-115] | 4500CNCMOD | 10/23/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-8 **Description:** MATRIX SPIKE OF #1; BT-1S

**Date Received:** 10/19/2000

**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| lectrical Conductivity | NA | ---- | 9050A | |
| H | NA | ---- | ---- | |
| ntimony as Sb (Dissolved) | 100 | % [70-130] | 6020 | 11/06/2000 |
| rsenic as As (Dissolved) | 75 | % [70-130] | 6020 | 11/07/2000 |
| arium as Ba (Dissolved) | 100 | % [70-130] | 6020 | 11/06/2000 |
| eryllium as Be (Dissolved) | 85 | % [70-130] | 6020 | 11/10/2000 |
| admium as Cd (Dissolved) | 95 | % [70-130] | 6020 | 11/06/2000 |
| hromium as Cr (Dissolved) | 110 | % [70-130] | 6020 | 11/06/2000 |
| obalt as Co (Dissolved) | 105 | % [70-130] | 6020 | 11/06/2000 |
| opper as Cu (Dissolved) | 105 | % [70-130] | 6020 | 11/10/2000 |
| on as Fe (Dissolved) | 97 | % [87-115] | 6010B | 11/06/2000 |
| ead as Pb (Dissolved) | 85 | % [70-130] | 6020 | 11/07/2000 |
| ercury as Hg (Dissolved) | 65(1) | % [86-120] | 7470A | 11/09/2000 |
| ckel as Ni (Dissolved) | 100 | % [70-130] | 6020 | 11/06/2000 |
| elenium as Se (Dissolved) | 95 | % [70-130] | 6020 | 11/10/2000 |
| lver as Ag (Dissolved) | 95 | % [70-130] | 6020 | 11/10/2000 |
| hallium as Tl (Dissolved) | 95 | % [70-130] | 6020 | 11/10/2000 |
| anadium as V (Dissolved) | 110 | % [70-130] | 6020 | 11/06/2000 |
| nc as Zn (Dissolved) | 106 | % [82-118] | 6010B | 11/06/2000 |
| P/AA Digestion Date | NA | ---- | | |
| P-MS Digestion Date | NA | ---- | | |
| ercury Digestion Date | ---- | ---- | 7470A | 11/08/2000 |
| trate + Nitrite as N | 101 | % [89-113] | 353.2 | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-9 **Description:** MATRIX SPIKE DUPLICATE OF #1; BT-1S
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 1027001009 | ---- | | |
| Benzene | 96 | % [72-104] | 8260B | 10/27/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 10/27/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 10/27/2000 |
| Bromoform | <1 | ug/l | 8260B | 10/27/2000 |
| Bromomethane | <1 | ug/l | 8260B | 10/27/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 10/27/2000 |
| Chlorobenzene | 98 | % [78-110] | 8260B | 10/27/2000 |
| Chloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| Chloroform | <1 | ug/l | 8260B | 10/27/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/27/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/27/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 10/27/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 10/27/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 10/27/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 10/27/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,1-Dichloroethene | 89 | % [62-106] | 8260B | 10/27/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/27/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 10/27/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 10/27/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/27/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 10/27/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 10/27/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 10/27/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**ample No.:** 2000100226-9 **Description:** MATRIX SPIKE DUPLICATE OF #1; BT-1S

**ate Received:** 10/19/2000

**ate Collected:** 10/18/2000 **Collected by:** CONNOLLY **Matrix:** WATER

| aboratory est | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| yrene | <1 | ug/l | 8260B | 10/27/2000 |
| 1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| etrachloroethene | <1 | ug/l | 8260B | 10/27/2000 |
| oluene | 96 | % [79-107] | 8260B | 10/27/2000 |
| 1,1-Trichloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| 1,2-Trichloroethane | <1 | ug/l | 8260B | 10/27/2000 |
| ichloroethene | 96 | % [78-106] | 8260B | 10/27/2000 |
| ichlorofluoromethane | <1 | ug/l | 8260B | 10/27/2000 |
| 2,3-Trichloropropane | <1 | ug/l | 8260B | 10/27/2000 |
| nyl chloride | <1 | ug/l | 8260B | 10/27/2000 |
| otal Xylenes | <2 | ug/l | 8260B | 10/27/2000 |
| crylonitrile | <10 | ug/l | 8260B | 10/27/2000 |
| arbon disulfide | <5 | ug/l | 8260B | 10/27/2000 |
| domethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/27/2000 |
| ,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/27/2000 |
| nyl acetate | <10 | ug/l | 8260B | 10/27/2000 |
| cetone | <20 | ug/l | 8260B | 10/27/2000 |
| ethyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/27/2000 |
| Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/27/2000 |
| Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/27/2000 |
| 2-Dichloroethane-d4 (Surrogate) | 87 | % [75-113] | 8260B | 10/27/2000 |
| oluene-d8 (Surrogate) | 100 | % [85-109] | 8260B | 10/27/2000 |
| Bromofluorobenzene (Surrogate) | 99 | % [90-114] | 8260B | 10/27/2000 |
| **ONTANA LANDFILL INORGANICS** | | | | |
| aloride as Cl | 96 | % [84-113] | 325.3 | 10/25/2000 |
| ulfate as SO4 | 102 | % [89-113] | 9036 | 10/30/2000 |
| hemical Oxygen Demand | 102 | % [90-111] | 410.2 | 10/25/2000 |
| anide as CN (Total) | 82 | % [61-115] | 4500CNCMOD | 10/23/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-9
**Description:** MATRIX SPIKE DUPLICATE OF #1; BT-1S
**Date Received:** 10/19/2000
**Date Collected:** 10/18/2000
**Collected by:** CONNOLLY
**Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | NA | ----- | | |
| pH | NA | ----- | ----- | |
| Antimony as Sb (Dissolved) | 95 | % [70-130] | 6020 | 11/06/2000 |
| Arsenic as As (Dissolved) | 70 | % [70-130] | 6020 | 11/07/2000 |
| Barium as Ba (Dissolved) | 95 | % [70-130] | 6020 | 11/06/2000 |
| Beryllium as Be (Dissolved) | 85 | % [70-130] | 6020 | 11/10/2000 |
| Cadmium as Cd (Dissolved) | 90 | % [70-130] | 6020 | 11/06/2000 |
| Chromium as Cr (Dissolved) | 100 | % [70-130] | 6020 | 11/06/2000 |
| Cobalt as Co (Dissolved) | 100 | % [70-130] | 6020 | 11/06/2000 |
| Copper as Cu (Dissolved) | 100 | % [70-130] | 6020 | 11/10/2000 |
| Iron as Fe (Dissolved) | 97 | % [87-115] | 6010B | 11/06/2000 |
| Lead as Pb (Dissolved) | 80 | % [70-130] | 6020 | 11/07/2000 |
| Mercury as Hg (Dissolved) | 55(1) | % [86-120] | 7470A | 11/09/2000 |
| Nickel as Ni (Dissolved) | 95 | % [70-130] | 6020 | 11/06/2000 |
| Selenium as Se (Dissolved) | 95 | % [70-130] | 6020 | 11/10/2000 |
| Silver as Ag (Dissolved) | 95 | % [70-130] | 6020 | 11/10/2000 |
| Thallium as Tl (Dissolved) | 95 | % [70-130] | 6020 | 11/10/2000 |
| Vanadium as V (Dissolved) | 100 | % [70-130] | 6020 | 11/06/2000 |
| Zinc as Zn (Dissolved) | 108 | % [82-118] | 6010B | 11/06/2000 |
| ICP/AA Digestion Date | NA | ----- | | |
| ICP-MS Digestion Date | NA | ----- | | |
| Mercury Digestion Date | ----- | ----- | 7470A | 11/08/2000 |
| Nitrate + Nitrite as N | 105 | % [89-113] | 353.2 | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

| | | | |
|---|---|---|---|
| **ample No.:** 2000100226-10 | **Description:** METHOD BLANK | | |
| **ate Received:** 10/19/2000 | | | |
| **ate Collected:** ----- | **Collected by:** PREPARED BY LAB | | **Matrix:** WATER |

| aboratory est | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **IONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| ata File Number-Volatiles | 1026001004 | ----- | | |
| enzene | <1 | ug/l | 8260B | 10/26/2000 |
| omochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| omodichloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| omoform | <1 | ug/l | 8260B | 10/26/2000 |
| omomethane | <1 | ug/l | 8260B | 10/26/2000 |
| rbon tetrachloride | <1 | ug/l | 8260B | 10/26/2000 |
| lorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| loroethane | <1 | ug/l | 8260B | 10/26/2000 |
| loroform | <1 | ug/l | 8260B | 10/26/2000 |
| loromethane (Methyl chloride) | <1 | ug/l | 8260B | 10/26/2000 |
| romochloromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 10/26/2000 |
| 2-Dibromoethane | <1 | ug/l | 8260B | 10/26/2000 |
| romomethane | <1 | ug/l | 8260B | 10/26/2000 |
| chlorodifluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| -Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| -Dichlorobenzene | <1 | ug/l | 8260B | 10/26/2000 |
| -Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| -Dichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| -Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| ,2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| 2-Dichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| -Dichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| 3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| ,3-Dichloropropene | <1 | ug/l | 8260B | 10/26/2000 |
| ylbenzene | <1 | ug/l | 8260B | 10/26/2000 |
| hylene chloride | <5 | ug/l | 8260B | 10/26/2000 |

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000100226-10 **Description:** METHOD BLANK
**Date Received:** 10/19/2000
**Date Collected:** ----- **Collected by:** PREPARED BY LAB **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Toluene | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 10/26/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 10/26/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 10/26/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 10/26/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 10/26/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 10/26/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 10/26/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 10/26/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 10/26/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 10/26/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 10/26/2000 |
| Acetone | <20 | ug/l | 8260B | 10/26/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 10/26/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 10/26/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 106 | % [75-113] | 8260B | 10/26/2000 |
| Toluene-d8 (Surrogate) | 101 | % [85-109] | 8260B | 10/26/2000 |
| 4-Bromofluorobenzene (Surrogate) | 105 | % [90-114] | 8260B | 10/26/2000 |
| **MONTANA LANDFILL INORGANICS** | | | | |
| Chloride as Cl | <2 | mg/l | 325.3 | 10/25/2000 |
| Sulfate as SO4 | <5 | mg/l | 9036 | 10/30/2000 |
| Chemical Oxygen Demand | <5 | mg/l | 410.2 | 10/25/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNCMOD | 10/18/2000 |

## orthern Analytical Laboratories, Inc.

**Client Name:** MAXIM TECHNOLOGIES, INC.
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**ample No.:** 2000100226-10 **Description:** METHOD BLANK
**ate Received:** 10/19/2000
**ate Collected:** ----- **Collected by:** PREPARED BY LAB **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| lectrical Conductivity | <10 | umhos/cm | 9050A | 10/27/2000 |
| H | NA | ----- | ----- | |
| ntimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 11/06/2000 |
| rsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 11/07/2000 |
| arium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| eryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 11/10/2000 |
| admium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 11/06/2000 |
| hromium as Cr (Dissolved) | <0.001 | mg/l | 6020 | 11/06/2000 |
| obalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 11/06/2000 |
| opper as Cu (Dissolved) | <0.001 | mg/l | 6020 | 11/10/2000 |
| on as Fe (Dissolved) | <0.05 | mg/l | 6010B | 11/06/2000 |
| ead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 11/07/2000 |
| ercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 11/09/2000 |
| ickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 11/06/2000 |
| elenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 11/10/2000 |
| ilver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 11/10/2000 |
| hallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 11/10/2000 |
| anadium as V (Dissolved) | <0.05 | mg/l | 6020 | 11/06/2000 |
| inc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 11/06/2000 |
| CP/AA Digestion Date | NA | ----- | | |
| CP-MS Digestion Date | NA | ----- | | |
| ercury Digestion Date | ----- | ----- | 7470A | 11/08/2000 |
| itrate + Nitrite as N | <0.05 | mg/l | 353.2 | 10/25/2000 |

BigTimber Landfill
Project or Site Name

9731053.100
Project Number

Connolly
Sampler Name (Printed)

Contact Name

# CHAIN OF CUSTODY RECORD

**NORTHERN**
**Analytical Laboratories, Inc.**

602 South 25th Street
Billings, Montana 59101

Maxim
Report to (Firm or Agency)

Address

Billings
City State Zip

Phone Fax

| DATE COLLECTED | TIME COLLECTED | SAMPLE LOCATION OR DESCRIPTION | COMP OR GRAB | SAMPLE MATRIX | NO. OF CONTAINERS | ANALYSIS REQUIRED: VOC's | Cyanide | Nutrients | Metals | Common | | | NOTES | LAB NUMBER 2000 100226 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/18 | 1230 | BT-15 | G | w | 7 | X | X | X | X | X | | | | 1 |
| | 1330 | BT-2 | G | w | 7 | X | X | X | X | X | | | | 2 |
| | 1140 | BT-6 | G | w | 7 | X | X | X | X | X | | | | 3 |
| | 1410 | BT-7 | G | w | 7 | X | X | X | X | X | | | | 4 |
| | – | ~~BT-8~~ | | | | | | | | | | | | |
| | 1240 | BT-1015 | G | w | 7 | X | X | X | X | X | | | | 5 |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | FIELD BLANK | G | w | 3 | X | | | | | | | | 6 |
| | | TRIP BLANK | | | | | | | | | | | DB | 7 |
| | | | | | | | | | | | | | MB MS | 8 |
| | | | | | | | | | | | | | MS MSD | 9 |
| | | | | | | | | | | | | | MSD MB | 10 |

| | | | |
|---|---|---|---|
| Relinquished by: | Date 10/19 | Time 0815 | Received by: |
| Relinquished by: | Date | Time | Received by: |
| Relinquished by: | Date | Time | Received by: |

**NORTHERN**
**Analytical Laboratories, Inc.**

# SAMPLE RECEIPT CHECKLIST

Valued Client: This checklist documents the condition of your sample(s) as it (they) arrived at our lab. Please review it and familiarize yourself with its contents. Should you have any questions or comments, please contact us. Thank you for your use of our services.

t Name M·Bigo
ct Big T Landfill
ratory Number(s) P00226
klist Completed by mw 10/19/00 (Initials / Date)

Date/Time Received 10/19/00 0815 (Date / Time)
Received by CS
Carrier Name Hand
Sample Type H2O

| | YES | NO |
|---|---|---|
| hipping container in good condition? | ✓ | |
| ustody seals present on shipping container?<br>ondition: Intact ____ Broken ____ | | ✓ |
| hain of custody present? | ✓ | |
| hain of custody signed when relinquished nd received? | ✓ | |
| hain of custody agrees with sample labels? | ✓ | |
| ustody seals on sample bottles?<br>ondition: Intact ____ Broken ____ | | ✓ |
| amples in proper container/bottle?* | ✓ | |
| ample containers intact?* | ✓ | |
| ufficient sample volume for indicated test?* | ✓ | |
| ce/Frozen Blue Ice present in shipping ontainer? (circle one) | ✓ | |
| ontainer temperature 1. 0.6 C 2. ____ 3. ____<br>(if <0 or>10) | | |
| ll samples rec'd within holding time?* | ✓ | |
| OA vials have zero headspace?<br>(if contains >5mm headspace) | ✓ | |
| rip Blank received? | ✓ | |

| | YES | NO |
|---|---|---|
| 14. pH check performed by: ____________ | | |
| 15. Metals bottle(s) pH <2? | ✓ | |
| 16. Nutrient bottle(s) pH <2? | ✓ | |
| 17. Cyanide bottle(s) pH >12? | ✓ | |
| 18. Sulfide bottle(s) pH >9? | NA | |
| 19. TOC bottle(s) pH <2? | | |
| 20. Phenolics bottle(s) pH <2? | | |
| 21. Oil & grease bottle(s) pH <2?<br>(checked by analyst) | | |
| 22. DRO/418.1 bottle(s) pH <2?<br>(checked by analyst) | ✓ | |
| 23. Volatiles (VOA) pH <2?<br>(VOA pH checked by analyst) | ✓ pp | |
| 24. Herbicides (515) pH <2?<br>(checked by analyst) | NA | |
| 25. Semivolatiles (525) pH <2?<br>(checked by analyst) | | |
| 26. Client contacted? | | |
| 27. Person contacted | | |
| 28. Date contacted | | |

**OTES:** **Samples may be affected when not transported at the temperature recommended by the EPA for the test you've selected. Please contact the lab if you have concerns about the temperature of your samples.**

**Critical item - if marked "NO" contact lab manager.**

**OMMENTS:** ____________________

ORIGINAL

# APRIL 2000
# GROUNDWATER MONITORING RESULTS
# BIG TIMBER SANITARY LANDFILL
# BIG TIMBER, MONTANA

RECEIVED

JUN 22 2000

MONTANA
DEPT. OF ENVIRONMENTAL QUALITY
COMMUNITY SERVICES BUREAU

MAXIM
TECHNOLOGIES INC

[redacted]

# APRIL 2000
# GROUNDWATER MONITORING RESULTS
# BIG TIMBER SANITARY LANDFILL
# BIG TIMBER, MONTANA

**MAXIM**®
TECHNOLOGIES INC

*Consulting Engineers & Environmental Scientists*
*618 South 25th Street*
*P O Box 30615*
*Billings, MT 59107*

*Telephone: (406) 248-9161*
*Fax: (406) 248-9282*

June 20, 2000

ORIGINAL

Mr. Ron Thomas
City of Big Timber
P.O. Box 416
Big Timber, MT 59011

RECEIVED
JUN 22 2000
MONTANA
DEPT. OF ENVIRONMENTAL QUALITY
COMMUNITY SERVICES BUREAU

**SUBJECT:** **April 2000 Groundwater Monitoring Results**
**Big Timber Sanitary Landfill**
**Big Timber, Montana**
**Maxim Project No. 9731053.100**

Dear Mr. Thomas:

The attached report presents groundwater monitoring data collected by Maxim Technologies, Inc. (Maxim) during April 2000 at the Big Timber Sanitary Landfill in Big Timber, Montana. The work was conducted in accordance with our proposal dated July 5, 1994 and the terms and conditions of the Professional Services Agreement between Maxim and the City of Big Timber dated September 30, 1994.

Concentrations of all parameters measured during this monitoring event were below regulatory enforcement standards. These results were similar to previous monitoring events.

Please review this report. Copies have been forwarded to:

Montana Department of Environmental Quality
Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

If you have any questions regarding this report or any aspect of the project, please do not hesitate to call us. We appreciate the opportunity to serve your environmental consulting needs.

Respectfully Submitted,

**Maxim Technologies, Inc.®**

Brian H. McHugh
Brian H. McHugh, P.G.
Office Manager

Jeffrey R. Rice
Environmental Group Manager

BMc(JRR)rmr

Enclosures
cc: Pat Crowley, MDEQ, Helena
Erl Tufte, Morrison Maierle, Inc., Billings

n:\typing\envir\9731053\apr00gw report

# APRIL 2000
# GROUNDWATER MONITORING RESULTS
# BIG TIMBER SANITARY LANDFILL
# BIG TIMBER, MONTANA

Prepared for:

City of Big Timber
P.O. Box 416
Big Timber, Montana 59011

Prepared by:

Maxim Technologies, Inc.
P.O. Box 30615
Billings, Montana 59107

Maxim Project No. 9731053.100

June 2000

n:\typing\envir\9731053\apr00gw report

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## 1.0 INTRODUCTION

This report presents groundwater monitoring data collected by Maxim Technologies, Inc., (Maxim), at the Big Timber Sanitary Landfill (Figures 1 and 2) on April 25, 2000. Maxim personnel completed groundwater monitoring activities at the landfill in accordance with the Professional Services Agreement between the City of Big Timber and Maxim, dated September 30, 1994 and the Sampling and Analysis Plan dated April 1995 (Maxim, 1995).

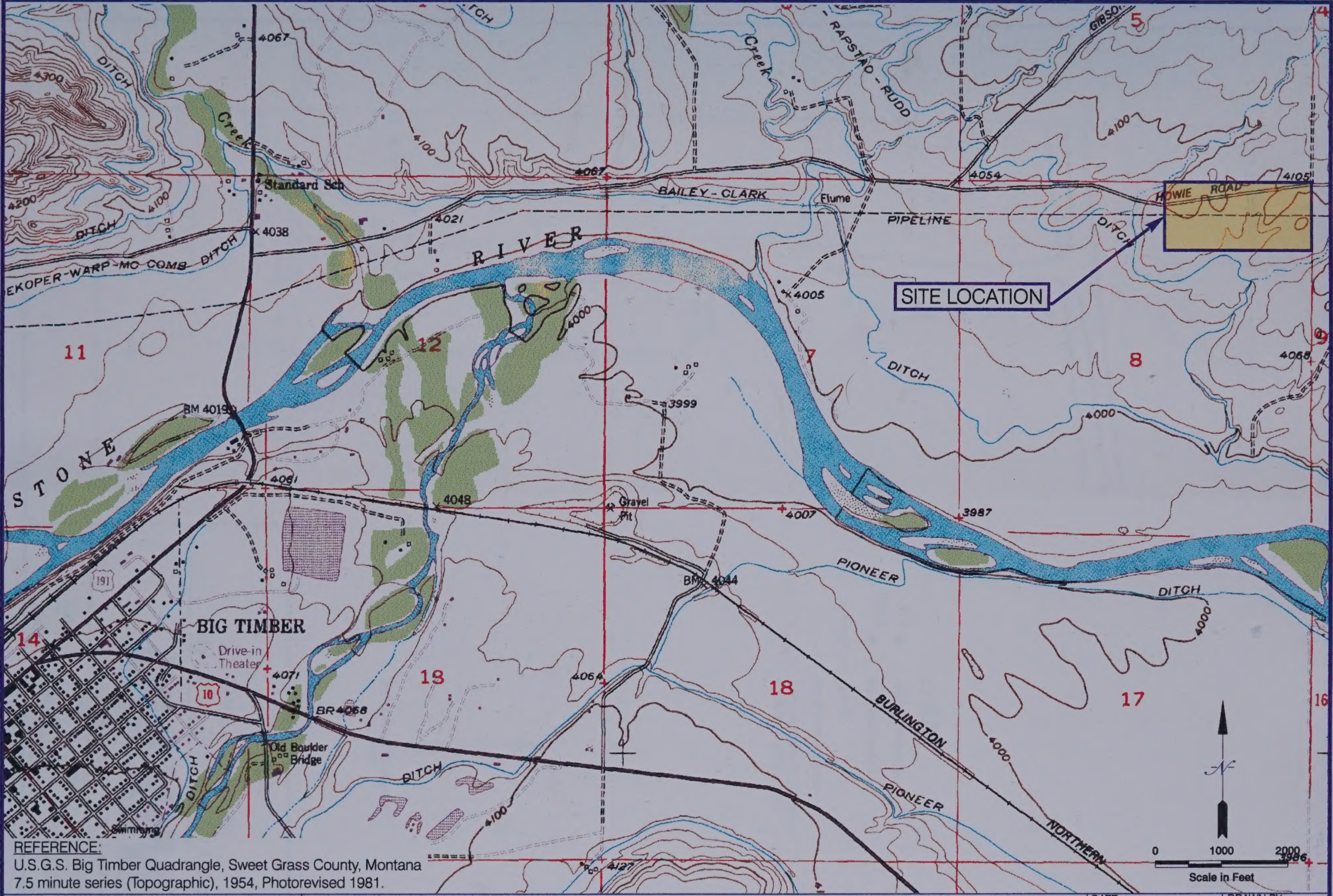
The Big Timber Sanitary landfill stopped accepting waste during April 1997 and has completed implementation of its closure plan. The Administrative Rules of Montana Title 17, Chapter 50, Sub-Chapter 7 (ARM 17.50.7), require semi-annual groundwater monitoring at Class II municipal solid waste landfills. This monitoring event was conducted to fulfill post-closure monitoring requirements of these rules. Methods used to complete groundwater monitoring activities and results of this monitoring event are described in Sections 2.0 and 3.0 of this report.

## 2.0 METHODS

Field data collection activities and laboratory analyses were completed in accordance with procedures described in Maxim's Sampling and Analysis Plan (Maxim, 1995). In accordance with correspondence from the MDEQ Waste Management Division dated April 12, 1995, deviations from the Sampling and Analysis Plan included the following:

- Groundwater samples were not collected from monitoring wells BT-1D and BT-3 through BT-5.

- A groundwater sample was collected from monitoring well BT-7.


SITE LOCATION
HOWIE ROAD
BAILEY - CLARK
PIPELINE
Flume
RAPSTAD - RUDD
GIBSON
Creek
DITCH
STONE
RIVER
EKOPER-WARP-MC COMB DITCH
Standard Sch
BIG TIMBER
Drive-in Theater
Old Boulder Bridge
Gravel Pit
Swimming
PIONEER
DITCH
BURLINGTON
NORTHERN
BM 4015
BM 4044
BR 4068
4067
4038
4021
4054
4105
4005
3999
4061
4048
4007
3987
4068
4071
4064
4127
3986
4000
4100
4200
4300
5
11
12
7
8
9
14
13
18
17
16
191
10
0
1000
2000
Scale in Feet
N

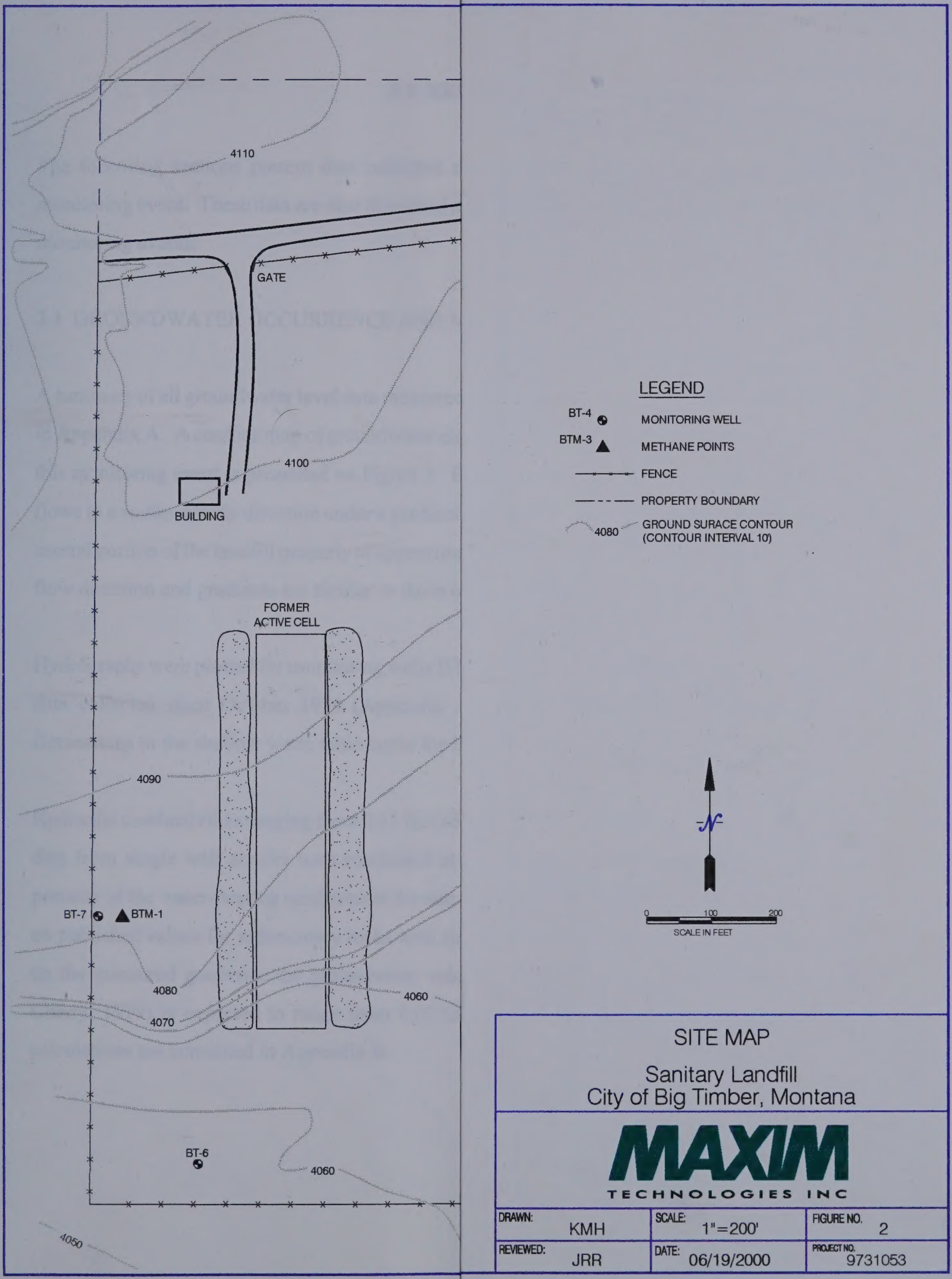
REFERENCE:
U.S.G.S. Big Timber Quadrangle, Sweet Grass County, Montana
7.5 minute series (Topographic), 1954, Photorevised 1981.

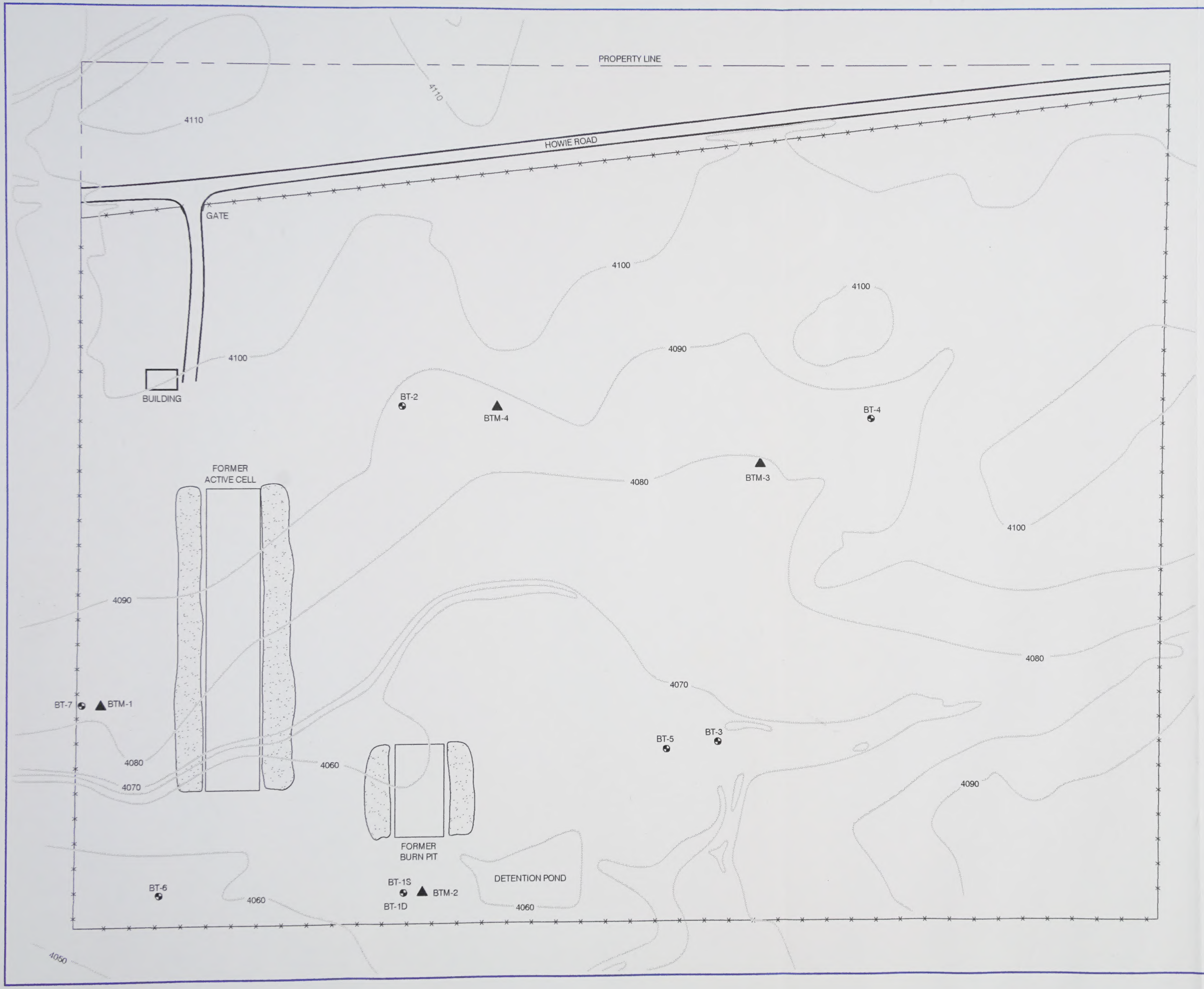
MAXIM
TECHNOLOGIES INC

SITE LOCATION MAP

City Of Big Timber Sanitary Landfill
Sweet Grass County, Montana

| | |
|---|---|
| DATE: 06/19/2000 | DRAWN BY: KMH |
| REVIEWED: JRR | SCALE: 1"=2000' |
| PROJ. NO.: 9731053 | FIGURE NO.: 1 |


4110
GATE
4100
BUILDING
FORMER ACTIVE CELL
4090
BT-7
BTM-1
4080
4070
4060
BT-6
4060
4050
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
N
0
100
200
SCALE IN FEET
SITE MAP
Sanitary Landfill
City of Big Timber, Montana
MAXIM TECHNOLOGIES INC
DRAWN: KMH
SCALE: 1"=200'
FIGURE NO. 2
REVIEWED: JRR
DATE: 06/19/2000
PROJECT NO. 9731053

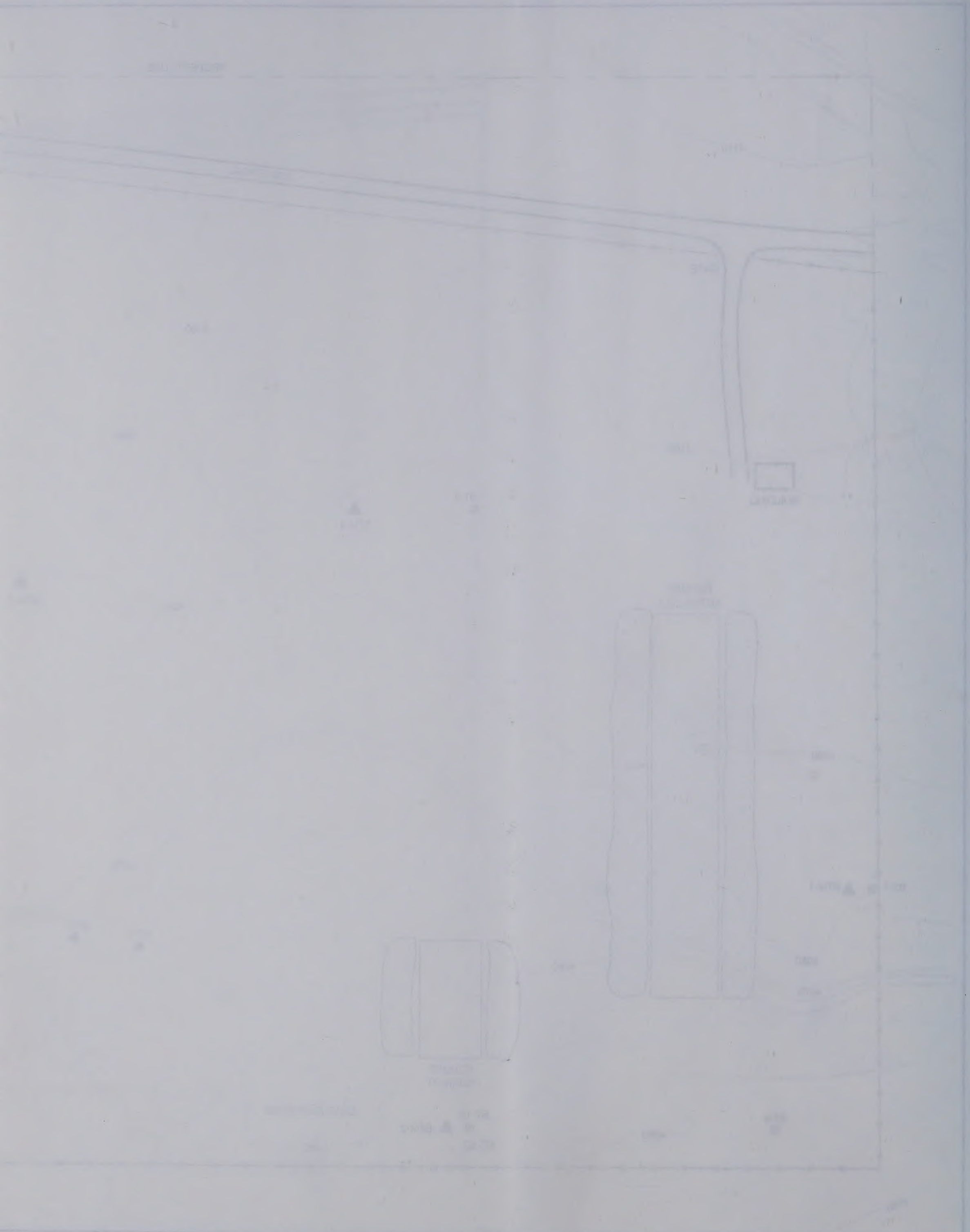

PROPERTY LINE
4110
4110
HOWIE ROAD
GATE
4100
BUILDING
4100
4090
4100
BT-2
BTM-4
BT-4
BTM-3
4080
4100
FORMER
ACTIVE CELL
4090
BT-7
BTM-1
4080
4070
4060
4070
BT-5
BT-3
4080
4090
FORMER
BURN PIT
DETENTION POND
BT-6
4060
BT-1S
BTM-2
BT-1D
4060
4050
LEGEND
BT-4 MONITORING WELL
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
N
0
100
200
SCALE IN FEET

## SITE MAP

Sanitary Landfill
City of Big Timber, Montana

MAXIM
TECHNOLOGIES INC

| | | |
|---|---|---|
| DRAWN: KMH | SCALE: 1"=200' | FIGURE NO. 2 |
| REVIEWED: JRR | DATE: 06/19/2000 | PROJECT NO. 9731053 |



# 3.0 RESULTS

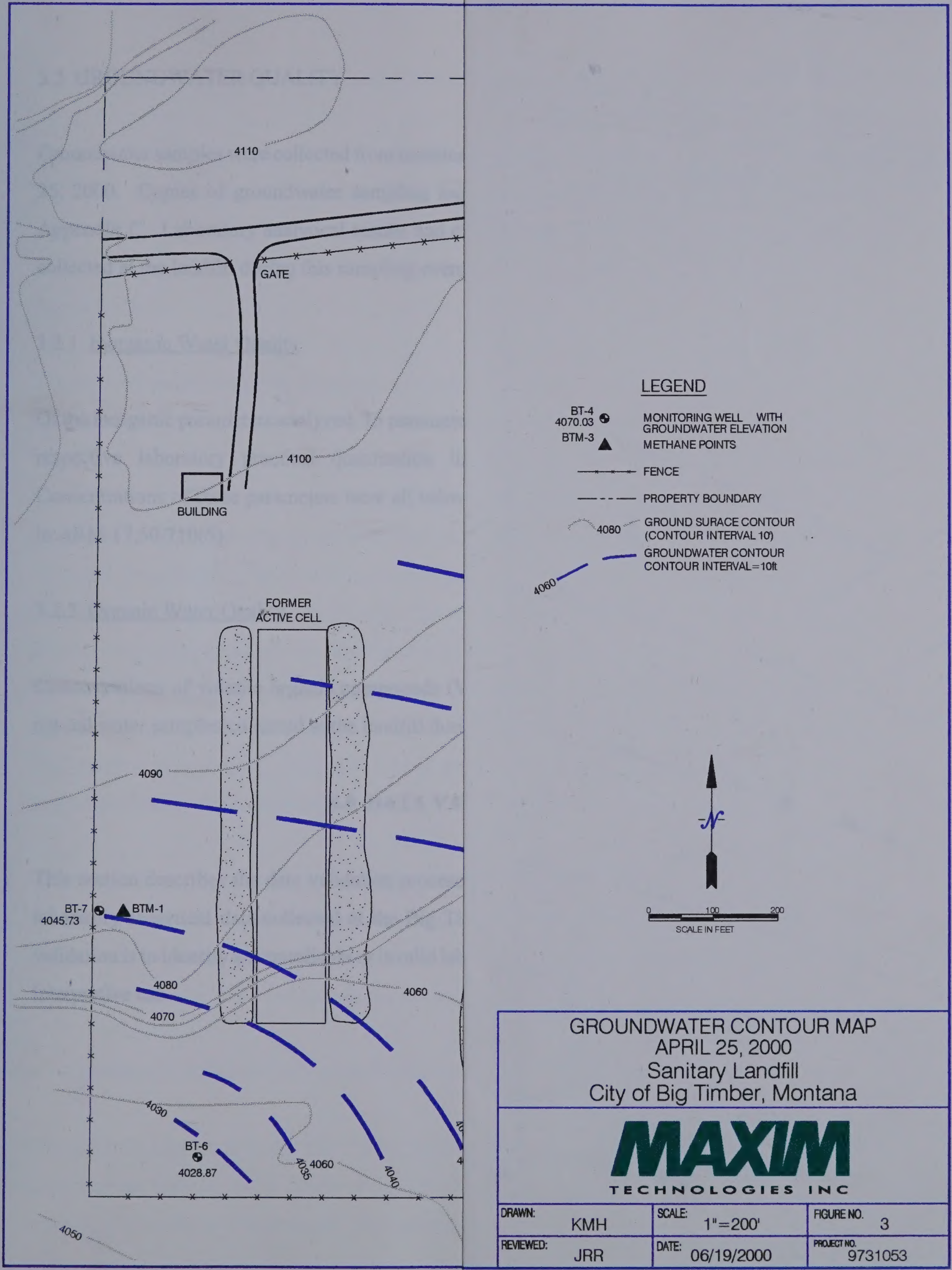
The following sections present data collected at the Big Timber Sanitary Landfill during this monitoring event. These data are also discussed and compared with data collected during previous monitoring events.

## 3.1 GROUNDWATER OCCURRENCE AND MOVEMENT

A summary of all groundwater level data measured at the landfill since September 1989 is contained in Appendix A. A contour map of groundwater elevations calculated from the data collected during this monitoring event is presented on Figure 3. Based on the groundwater contours, groundwater flows in a southwesterly direction under a gradient that varies from approximately 2.5 percent in the central portion of the landfill property to approximately 5.2 percent in the southwestern portion. The flow direction and gradients are similar to those calculated from previous measurements.

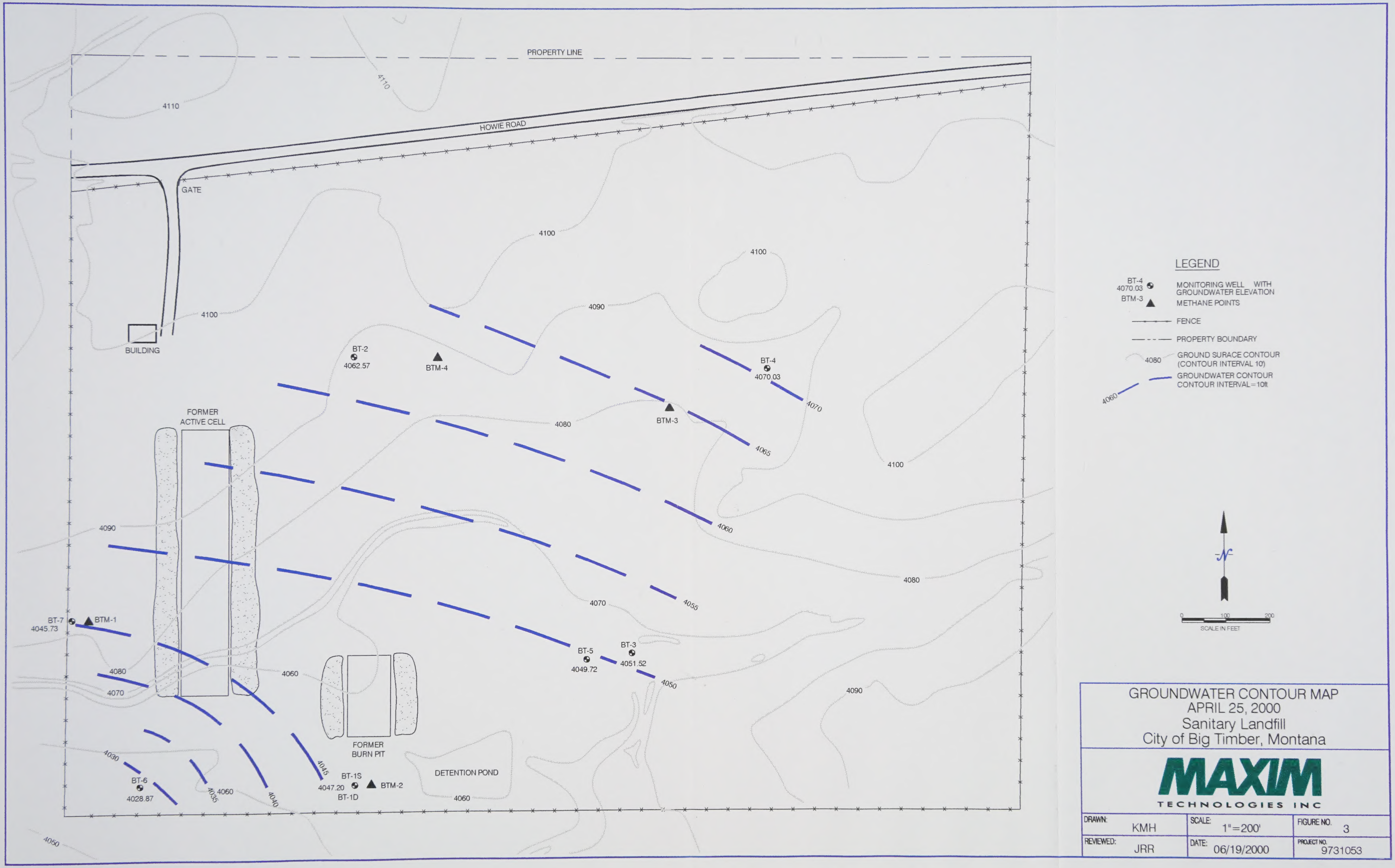
Hydrographs were plotted for monitoring wells BT-1S, BT-4, BT-5, and BT-6 using the water level data collected since October 1994 (Appendix A). These hydrographs indicate that seasonal fluctuations in the shallow water table under the landfill are generally not significant.

Hydraulic conductivities ranging from 0.31 feet per day (ft/day) to 0.85 ft/day were calculated using data from single well aquifer tests conducted at the site (Chen-Northern, 1990). The effective porosity of the water-bearing sandstone at the site is estimated to range from 5 to 30 percent, based on published values for sedimentary rocks with similar textures (Freeze and Cherry, 1979). Based on the measured gradients, the groundwater velocity calculated using Darcy's Law (Freeze and Cherry, 1979) is expected to range from 0.03 to 0.85 ft/day at the site. Groundwater velocity calculations are contained in Appendix B.


4110
GATE
4100
BUILDING
LEGEND
BT-4
4070.03
MONITORING WELL WITH GROUNDWATER ELEVATION
BTM-3
METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080
GROUND SURACE CONTOUR (CONTOUR INTERVAL 10')
GROUNDWATER CONTOUR CONTOUR INTERVAL=10ft
4060
FORMER ACTIVE CELL
4090
BT-7
4045.73
BTM-1
4080
4070
4060
4030
BT-6
4028.87
4035
4060
4040
4050
0
100
200
SCALE IN FEET
N
MAXIM
TECHNOLOGIES INC

GROUNDWATER CONTOUR MAP
APRIL 25, 2000
Sanitary Landfill
City of Big Timber, Montana

| | | |
|---|---|---|
| DRAWN: KMH | SCALE: 1"=200' | FIGURE NO. 3 |
| REVIEWED: JRR | DATE: 06/19/2000 | PROJECT NO. 9731053 |



PROPERTY LINE
HOWIE ROAD
GATE
BUILDING
4110
4100
4090
4080
4070
4060
4050
FORMER ACTIVE CELL
FORMER BURN PIT
DETENTION POND
BT-2
4062.57
BTM-4
BT-4
4070.03
BTM-3
BT-7
4045.73
BTM-1
BT-5
4049.72
BT-3
4051.52
BT-1S
4047.20
BT-1D
BTM-2
BT-6
4028.87
4070
4065
4060
4055
4050
4045
4040
4035
4030
LEGEND
BT-4 4070.03 MONITORING WELL WITH GROUNDWATER ELEVATION
BTM-3 METHANE POINTS
FENCE
PROPERTY BOUNDARY
4080 GROUND SURACE CONTOUR (CONTOUR INTERVAL 10)
4060 GROUNDWATER CONTOUR CONTOUR INTERVAL=10ft
N
0 100 200
SCALE IN FEET

GROUNDWATER CONTOUR MAP
APRIL 25, 2000
Sanitary Landfill
City of Big Timber, Montana

MAXIM
TECHNOLOGIES INC

| | | |
|---|---|---|
| DRAWN: KMH | SCALE: 1"=200' | FIGURE NO. 3 |
| REVIEWED: JRR | DATE: 06/19/2000 | PROJECT NO. 9731053 |

## 3.2 GROUNDWATER QUALITY

Groundwater samples were collected from monitoring wells BT-1S, BT-2, BT-6, and BT-7 on April 25, 2000. Copies of groundwater sampling logs from this monitoring event are contained in Appendix C. Laboratory analytical results and chain of custody forms for groundwater samples collected at the landfill during this sampling event are presented in Appendix D.

### 3.2.1 Inorganic Water Quality

Of the inorganic parameters analyzed, 15 parameters were detected with concentrations above their respective laboratory practical quantitation limits (PQLs) during this monitoring event. Concentrations of these parameters were all below regulatory enforcement standards as described in ARM 17.50.710(5).

### 3.2.2 Organic Water Quality

Concentrations of volatile organic compounds (VOCs) were below their respective PQLs in all natural water samples collected at the landfill during this monitoring event.

# 4.0 DATA VALIDATION

This section describes the data validation process used to determine the adequacy and quality of laboratory analytical data collected at the Big Timber Sanitary Landfill. The objective of data validation is to identify any unreliable or invalid laboratory measurements and qualify those data for interpretive use.

## 4.1 FIELD QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

A field duplicate sample (BT-101S) was collected during this monitoring event from monitoring well BT-1S. A trip blank was also submitted to the laboratory. This trip blank consisted of deionized water which was prepared and containerized by laboratory personnel and transported to the landfill prior to laboratory submittal. Laboratory analytical reports for these samples are presented in Appendix D.

The field duplicate sample was analyzed for inorganic parameters and VOCs. The trip blank was analyzed for VOCs only. No VOCs were detected at concentrations above the PQLs in the trip blank.

Analytical results for the original and duplicate samples collected from monitoring well BT-1S were evaluated by calculating the relative percent difference (RPD) between the two samples for those parameters with concentrations greater than five times the PQL. If the RPD for a pair of samples is greater than 20%, the values are considered to be estimated. The absolute value difference (AVD) between the two samples was calculated when one or both values for a given parameter were less than five times the PQL. If the AVD for a pair of samples is greater than the PQL, the values are considered to be estimated. These procedures are recommended in United States Environmental Protection Agency (EPA) data validation guidelines (EPA, 1988).

Calculated RPDs for chloride, sulfate, COD, electrical conductivity, pH, and nitrate were less than 20 percent. Calculated AVDs for barium, chromium, and selenium were less than or equal to the PQL. These results are all therefore considered valid. The calculated AVD's for copper and silver were greater than the PQL and are considered estimated.

## 4.2 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Groundwater samples from the Big Timber Sanitary Landfill were received at Maxim's analytical laboratory on April 26, 2000. Chain of custody documents accompanied the samples from sample collection to receipt at the laboratory. The water sample collected from monitoring well BT-1S was

split to obtain matrix spike and matrix spike duplicate samples. A review of laboratory quality assurance/quality control procedures indicates that the reported analytical results are valid.

## 5.0 LIMITATIONS

This work was performed in accordance with the generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Maxim observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Maxim's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgement concerning the significance of the data gathered during the course of the monitoring. Other than this, no warranty is implied or intended.

Prepared by:
Mark F. Dawson (for)
Jeffrey R. Rice
Environmental Group Manager

Reviewed by:
Brian H. McHugh
Brian H. McHugh, P.G.
Office Manager

## 6.0 REFERENCES CITED

Chen-Northern, 1990, Hydrogeologic Investigation Report, Proposed Big Timber Landfill Site, Big Timber, Montana, report submitted to the City of Big Timber, January.

Freeze and Cherry, 1979, Groundwater, Prentice-Hall, Inc., Englewood Cliffs, NJ.

Maxim, 1995, Groundwater Monitoring Sampling and Analysis Plan, City of Big Timber Sanitary Landfill, Big Timber, Montana, report submitted to the City of Big Timber, April.

Montana Department of Environmental Quality, 1995, Circular WQB-7, Montana Numeric Water Quality Standards, Water Quality Division, August.

United States Environmental Protection Agency, 1988, Laboratory Data Validation; Functional Guidelines for Evaluating Inorganic Analyses, prepared by Viar & Co.

# APPENDIX A
## Groundwater Elevation Data

## GROUNDWATER ELEVATION MEASUREMENTS
## BIG TIMBER SANITARY LANDFILL
## BIG TIMBER, MONTANA
## MAXIM PROJECT NO. 9731053-100

ALL MEASUREMENTS IN FEET

WELL NO. BT-1S
REFERENCE ELEVATIO 4067.78
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.42 | 4049.36 | | |
| 07/19/90 | 19.08 | 4048.70 | -0.66 | |
| 10/04/94 | 17.06 | 4050.72 | 2.02 | |
| 01/30/95 | 17.92 | 4049.86 | -0.86 | |
| 02/27/95 | 14.87 | 4052.91 | 3.05 | |
| 03/27/95 | 15.13 | 4052.65 | -0.26 | |
| 04/28/95 | 15.98 | 4051.80 | -0.85 | |
| 05/26/95 | 15.17 | 4052.61 | 0.81 | |
| 06/30/95 | 15.50 | 4052.28 | -0.33 | |
| 07/31/95 | 15.92 | 4051.86 | -0.42 | |
| 08/22/95 | 16.25 | 4051.53 | -0.33 | |
| 09/30/95 | 16.83 | 4050.95 | -0.58 | |
| 10/31/95 | 17.33 | 4050.45 | -0.50 | |
| 11/28/95 | 17.33 | 4050.45 | 0.00 | |
| 12/26/95 | 17.50 | 4050.28 | -0.17 | Well Resurveyed; New Elevation = 4067.67 |
| 01/16/96 | 17.51 | 4050.27 | -0.01 | |
| 10/08/96 | 16.67 | 4051.00 | 0.73 | |
| 04/29/97 | 16.00 | 4051.67 | 0.67 | |
| 12/10/97 | 15.71 | 4051.96 | 0.29 | |
| 11/19/98 | 17.64 | 4050.03 | -1.93 | |
| 05/06/99 | 18.15 | 4049.52 | -0.51 | |
| 10/20/99 | 19.54 | 4048.13 | -1.39 | |
| 04/25/00 | 20.47 | 4047.20 | -0.93 | |

WELL NO. BT-1D
REFERENCE ELEVATIO 4067.78
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 18.36 | 4049.42 | | |
| 07/19/90 | 19.23 | 4048.55 | -0.87 | |
| 10/04/94 | 17.30 | 4050.48 | 1.93 | |
| 01/30/95 | 17.83 | 4049.95 | -0.53 | |
| 02/27/95 | 15.37 | 4052.41 | 2.46 | |
| 03/27/95 | 15.29 | 4052.49 | 0.08 | |
| 04/28/95 | 17.60 | 4050.18 | -2.31 | |
| 05/26/95 | 17.50 | 4050.28 | 0.10 | |
| 06/30/95 | 17.08 | 4050.70 | 0.42 | |
| 07/31/95 | 16.66 | 4051.12 | 0.42 | |
| 08/22/95 | 17.16 | 4050.62 | -0.50 | |
| 09/30/95 | 17.25 | 4050.53 | -0.09 | |
| 10/31/95 | 17.92 | 4049.86 | -0.67 | |
| 11/28/95 | 17.33 | 4050.45 | 0.59 | |
| 12/26/95 | 17.58 | 4050.20 | -0.25 | Well Resurveyed; New Elevation = 4067.43 |
| 01/16/96 | 17.38 | 4050.40 | 0.20 | |
| 10/08/96 | 16.58 | 4050.85 | 0.45 | |
| 04/29/97 | NM | NM | NM | |
| 12/10/97 | 15.85 | 4051.58 | 0.73 | |
| 11/19/98 | 18.07 | 4049.36 | -2.22 | |
| 05/06/99 | 18.85 | 4048.58 | -0.78 | |
| 10/20/99 | 19.28 | 4048.15 | -0.43 | |
| 04/25/00 | 19.75 | 4047.68 | -0.47 | |

WELL NO. BT-2
REFERENCE ELEVATIO 4090.55
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS | |
|---|---|---|---|---|---|
| 09/08/89 | 23.64 | 4066.91 | | | |
| 07/19/90 | 27.29 | 4063.26 | -3.65 | | |
| 10/04/94 | 26.34 | 4064.21 | 0.95 | | |
| 01/30/95 | 23.71 | 4066.84 | 2.63 | | |
| 02/27/95 | 23.50 | 4067.05 | 0.21 | | |
| 03/27/95 | 23.33 | 4067.22 | 0.17 | | |
| 04/28/95 | 25.03 | 4065.52 | -1.70 | | |
| 05/26/95 | 24.42 | 4066.13 | 0.61 | | |
| 06/30/95 | 24.50 | 4066.05 | -0.08 | | |
| 07/31/95 | 25.00 | 4065.55 | -0.50 | | |
| 08/22/95 | 25.00 | 4065.55 | 0.00 | | |
| 09/30/95 | 25.16 | 4065.39 | -0.16 | | |
| 10/31/95 | 25.42 | 4065.13 | -0.26 | | |
| 11/28/95 | 25.58 | 4064.97 | -0.16 | | |
| 12/26/95 | 25.83 | 4064.72 | -0.25 | Well Resurveyed; New Elevation = | 4090.35 |
| 01/16/96 | 25.61 | 4064.74 | 0.02 | | |
| 10/08/96 | 25.40 | 4064.95 | 0.21 | | |
| 04/29/97 | 25.34 | 4065.01 | 0.06 | | |
| 12/10/97 | 25.46 | 4064.89 | -0.12 | | |
| 11/19/98 | 26.58 | 4063.77 | -1.12 | | |
| 05/06/99 | 27.02 | 4063.33 | -0.44 | | |
| 10/20/99 | 27.37 | 4062.98 | -0.35 | | |
| 04/25/00 | 27.78 | 4062.57 | -0.41 | | |

WELL NO. BT-3
REFERENCE ELEVATIO 4069.31
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS | |
|---|---|---|---|---|---|
| 09/08/89 | 14.67 | 4054.64 | | | |
| 07/19/90 | 15.70 | 4053.61 | -1.03 | | |
| 10/04/94 | 13.68 | 4055.63 | 2.02 | | |
| 01/30/95 | 12.66 | 4056.65 | 1.02 | | |
| 02/27/95 | 12.04 | 4057.27 | 0.62 | | |
| 03/27/95 | 12.33 | 4056.98 | -0.29 | | |
| 04/28/95 | 12.94 | 4056.37 | -0.61 | | |
| 05/26/95 | 12.79 | 4056.52 | 0.15 | | |
| 06/30/95 | 11.83 | 4057.48 | 0.96 | | |
| 07/31/95 | 12.16 | 4057.15 | -0.33 | | |
| 08/22/95 | 12.42 | 4056.89 | -0.26 | | |
| 09/30/95 | 12.75 | 4056.56 | -0.33 | | |
| 10/31/95 | 12.92 | 4056.39 | -0.17 | | |
| 11/28/95 | 13.00 | 4056.31 | -0.08 | | |
| 12/26/95 | 13.08 | 4056.23 | -0.08 | Well Resurveyed; New Elevation = | 4069.12 |
| 01/16/96 | 13.06 | 4056.25 | 0.02 | | |
| 10/08/96 | 12.40 | 4056.72 | 0.47 | | |
| 04/29/97 | 11.23 | 4057.89 | 1.17 | | |
| 12/10/97 | 10.65 | 4058.47 | 0.58 | | |
| 11/19/98 | 14.69 | 4054.43 | -4.04 | | |
| 05/06/99 | 15.54 | 4053.58 | -0.85 | | |
| 10/20/99 | 16.62 | 4052.50 | -1.08 | | |
| 04/25/00 | 17.60 | 4051.52 | -0.98 | | |

WELL NO. BT-4
REFERENCE ELEVATIO 4087.64
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 09/08/89 | 16.62 | 4071.02 | | |
| 07/19/90 | 16.79 | 4070.85 | -0.17 | |
| 10/04/94 | 15.71 | 4071.93 | 1.08 | |
| 01/30/95 | 14.66 | 4072.98 | 1.05 | |
| 02/27/95 | 13.71 | 4073.93 | 0.95 | |
| 03/27/95 | 13.96 | 4073.68 | -0.25 | |
| 04/28/95 | 15.30 | 4072.34 | -1.34 | |
| 05/26/95 | 14.42 | 4073.22 | 0.88 | |
| 06/30/95 | 15.00 | 4072.64 | -0.58 | |
| 07/31/95 | 14.58 | 4073.06 | 0.42 | |
| 08/22/95 | 15.58 | 4072.06 | -1.00 | |
| 09/30/95 | 15.16 | 4072.48 | 0.42 | |
| 10/31/95 | 15.92 | 4071.72 | -0.76 | |
| 11/28/95 | 16.00 | 4071.64 | -0.08 | |
| 12/26/95 | 16.17 | 4071.47 | -0.17 | Well Resurveyed; New Elevation = 4087.45 |
| 01/16/96 | 16.04 | 4071.60 | 0.13 | |
| 10/08/96 | 15.51 | 4071.94 | 0.34 | |
| 04/29/97 | 15.31 | 4072.14 | 0.20 | |
| 12/10/97 | 15.68 | 4071.77 | -0.37 | |
| 11/19/98 | 16.34 | 4071.11 | -0.66 | |
| 05/06/99 | 16.93 | 4070.52 | -0.59 | |
| 10/20/99 | 17.07 | 4070.38 | -0.14 | |
| 04/25/00 | 17.42 | 4070.03 | -0.35 | |

WELL NO. BT-5
REFERENCE ELEVATIO 4069.25
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 07/19/90 | 18.45 | 4050.80 | | |
| 10/04/94 | 16.04 | 4053.21 | 2.41 | |
| 01/30/95 | 14.00 | 4055.25 | 2.04 | |
| 02/27/95 | 12.08 | 4057.17 | 1.92 | |
| 03/27/95 | 13.75 | 4055.50 | -1.67 | |
| 04/28/95 | 15.25 | 4054.00 | -1.50 | |
| 05/26/95 | 14.83 | 4054.42 | 0.42 | |
| 06/30/65 | 14.58 | 4054.67 | 0.25 | |
| 07/31/95 | 14.50 | 4054.75 | 0.08 | |
| 08/22/95 | 14.83 | 4054.42 | -0.33 | |
| 09/30/95 | 15.25 | 4054.00 | -0.42 | |
| 10/31/95 | 15.42 | 4053.83 | -0.17 | |
| 11/28/95 | 15.42 | 4053.83 | 0.00 | |
| 12/26/95 | 15.58 | 4053.67 | -0.16 | Well Resurveyed; New Elevation = 4068.96 |
| 01/16/96 | 15.55 | 4053.70 | 0.03 | |
| 10/08/96 | 14.71 | 4054.25 | 0.55 | |
| 04/29/97 | 13.47 | 4055.49 | 1.24 | |
| 12/10/97 | 12.97 | 4055.99 | 0.50 | |
| 11/19/98 | 16.99 | 4051.97 | -4.02 | |
| 05/06/99 | 17.60 | 4051.36 | -0.61 | |
| 10/20/99 | 18.82 | 4050.14 | -1.22 | |
| 04/25/00 | 19.24 | 4049.72 | -0.42 | |

WELL NO. BT-6
REFERENCE ELEVATIO 4057.57
REFERENCE POINT: TOP OF RISER PIPE

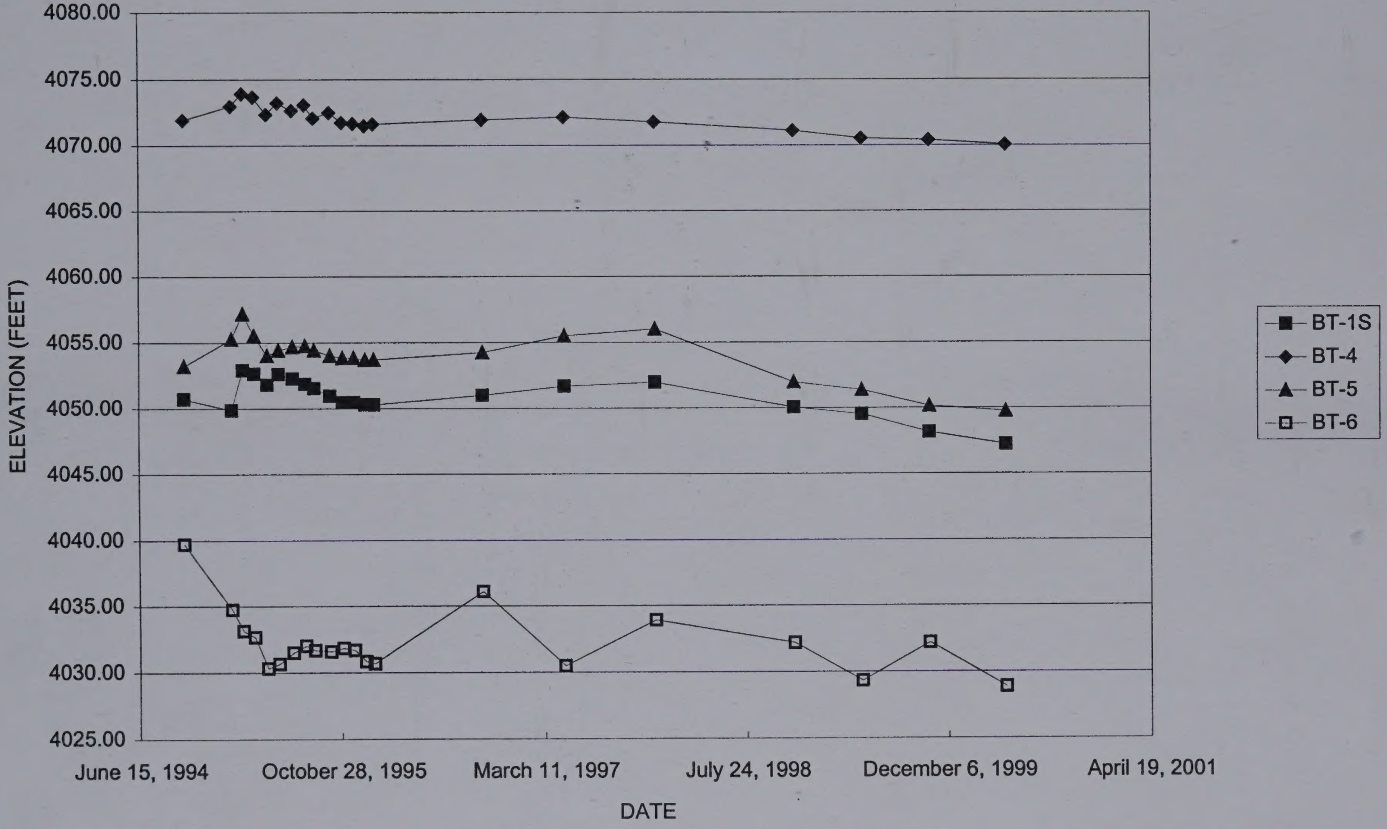
| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 07/19/90 | 22.65 | 4034.92 | | |
| 10/04/94 | 17.88 | 4039.69 | 4.77 | |
| 01/30/95 | 22.83 | 4034.74 | -4.95 | |
| 02/27/95 | 24.46 | 4033.11 | -1.63 | |
| 03/27/95 | 24.92 | 4032.65 | -0.46 | |
| 04/28/95 | 27.25 | 4030.32 | -2.33 | |
| 05/26/95 | 26.92 | 4030.65 | 0.33 | |
| 06/30/95 | 26.08 | 4031.49 | 0.84 | |
| 07/31/95 | 25.58 | 4031.99 | 0.50 | |
| 08/22/95 | 25.92 | 4031.65 | -0.34 | |
| 09/30/95 | 26.00 | 4031.57 | -0.08 | |
| 10/31/95 | 25.75 | 4031.82 | 0.25 | |
| 11/28/95 | 25.92 | 4031.65 | -0.17 | |
| 12/26/95 | 26.75 | 4030.82 | -0.83 | Well Resurveyed; New Elevation = 4057.69 |
| 01/16/96 | 26.91 | 4030.66 | -0.16 | |
| 10/08/96 | 21.60 | 4036.09 | 5.43 | |
| 04/29/97 | 27.21 | 4030.48 | -5.61 | |
| 12/10/97 | 23.79 | 4033.90 | 3.42 | |
| 11/19/98 | 25.53 | 4032.16 | -1.74 | |
| 05/06/99 | 28.37 | 4029.32 | -2.84 | |
| 10/20/99 | 25.52 | 4032.17 | 2.85 | |
| 04/25/00 | 28.82 | 4028.87 | -3.30 | |

WELL NO. BT-7
REFERENCE ELEVATIO 4085.71
REFERENCE POINT: TOP OF RISER PIPE

| DATE | DEPTH TO GROUND WATER | GROUND WATER ELEVATION | CHANGE IN GROUNDWATER ELEVATION | COMMENTS |
|---|---|---|---|---|
| 12/26/95 | 39.58 | 4046.13 | | |
| 01/16/96 | 38.47 | 4047.24 | 1.11 | |
| 10/08/96 | 38.00 | 4047.71 | 0.47 | |
| 04/29/97 | 38.21 | 4047.50 | -0.21 | |
| 12/10/97 | 38.15 | 4047.56 | 0.06 | |
| 11/19/98 | 39.20 | 4046.51 | -1.05 | |
| 05/06/99 | 39.60 | 4046.11 | -0.40 | |
| 10/20/99 | 39.71 | 4046.00 | -0.11 | |
| 04/25/00 | 39.98 | 4045.73 | -0.27 | |

LEGEND
NM: Not Measured

HYDROGRAPHS
MONITORING WELLS BT-1S, BT-4, BT-5, & BT-6



# APPENDIX B
# Groundwater Velocity Calculations

MAXIM TECHNOLOGIES INC® BY Jeff Rice DATE June 19, 2000

JOB TITLE Big Timber Landfill JOB NUMBER 9731053.100

SUBJECT Groundwater Velocity Calculations SHEET 1 of 1

$$v = \frac{Ki}{n}$$

$v$ = interstitial velocity
$K$ = hydraulic Conductivity
$i$ = gradient
$n$ = effective porosity

$K$ = 0.31 TO 0.85 ft/day (Chen-Northern, 1990)

$i$ = 0.025 TO 0.050 ft/ft (Figure 3)

$n$ = 0.05 TO ~~0.03~~ 0.30 (estimate, Freeze & Cherry 1979)

Low Range

$$v = \frac{(0.31)(0.025)}{0.30} = 0.03 \text{ ft/day}$$

High Range

$$v = \frac{(0.85)(0.05)}{0.05} = 0.85 \text{ ft/day}$$

## APPENDIX C
## Groundwater Sampling Logs

# GROUNDWATER SAMPLING LOG

1155 - 1240

| | |
|---|---|
| Project Name: BIG TIMBER LANDFILL | Well No: BT-1S & BT-101S (Dup) |
| Project No: 9731053.100 | Sampled By: KM / MU |
| Date: 4-25-00 | Weather: OVERCAST, SPRINKLES, LIGHT WIND ~50°F |

## WELL INFORMATION

| | | | |
|---|---|---|---|
| Depth of Well (ft) | 37.0′ | Casing Volume (gal) | 2.8 |
| M.P. Location | TOC - PVC | Purge Volume (gal) | 8.4 |
| Depth to GW (ft) | 20.47 | Product Thick. (ft) | NONE |
| Water Column (ft) | 16.53 | Well Condition | GOOD |
| Well Diameter (in) | 2" | | |

## PURGE DATA

Start Purge Time:

Purge Equipment: DISPOSABLE BAILER

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time | 3 | 4 | 5 | 6 | 7 | 8 | |
| Vol. Purged (gal) | 12:07 | 12:10 | 1213 | 1315 | 1317 | 1319 | |
| Flow Rate (gpm) | — | — | — | — | — | | |
| pH | 7.59 | 7.55 | 7.55 | 7.54 | 7.53 | 7.54 | |
| SC (umhos/cm @ 25°C) | 890 us | 885 | 885 | 890 | 890 | 890 | |
| T (°C) | 12.1 | 12.0 | 11.9 | 12.0 | 11.9 | 11.9 | |
| DO (mg/l) | — | — | — | — | — | — | |
| Water Color | TRANSPARENT w/ GREY TINT | | | | | | |

## SAMPLE DATA

| Sample Number | Sample Analyses | Container | # Bottles | Preserv. |
|---|---|---|---|---|
| BT-1S/BT-101S | VOCs | 40ml VOA | 3/3 | HCl |
| ↓ ↓ | CYANIDE | 500ml POLY | 1/1 | NaOH |
| | NUTRIENTS | " | 1/1 | $H_2SO_4$ |
| | DISS. METALS | " | 1/1 | $HNO_3$ |
| | COMMON IONS | 1000ml POLY | 1/1 | NONE |
| | | | | |

Sample Time: 1230

Sampling Equipment: DISPOSABLE PRESSURE BAILER

Comments/Additional Information DISSOLVED METALS SAMPLE THRU .45 MICRON FILTER

PRESSURE BAILER 10.5

FILTER - DRUM 16.0

# GROUNDWATER SAMPLING LOG

– 1155

| | |
|---|---|
| Project Name: BIG TIMBER | Well No: BT-2 |
| Project No: 9731053.100 | Sampled By: KM / MU |
| Date: 4-25-00 | Weather: OVERCAST, SPRINKLES ~50° |

## WELL INFORMATION

| | | | |
|---|---|---|---|
| Depth of Well (ft) | 43' | Casing Volume (gal) | 2.6 |
| M.P. Location | TOC-PVC | Purge Volume (gal) | 7.8 |
| Depth to GW (ft) | 27.78 | Product Thick. (ft) | NONE |
| Water Column (ft) | 15.22 | Well Condition | GOOD |
| Well Diameter (in) | 2" | | |

## PURGE DATA

Start Purge Time: 1103

Purge Equipment: DISPOSABLE BAILER

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time | 1104 | 1117 | 1121 | 1127 | 1130 | 1133 | |
| Vol. Purged (gal) | 0.25 | 4 | 5 | 6 | 7 | 8 | |
| Flow Rate (gpm) | NA | NA | NA | — | — | — | |
| pH | 7.44 | 7.90 | 8.07 | 8.28 | 8.41 | 8.50 | |
| SC (umhos/cm @ 25°C) | 317 uS | 307 | 307 | 317 | 313 | 317 | |
| T (°C) | 13.0 | 12.4 | 12.2 | 12.2 | 12.1 | 12.2 | |
| DO (mg/l) | NA | NA | NA | — | — | — | |
| Water Color | TRANSLUCENT<br>GREY BRN | → | → | → | → | → | |

## SAMPLE DATA

| Sample Number | Sample Analyses | Container | # Bottles | Preserv. |
|---|---|---|---|---|
| BT-2 | VOC | 4ml VOA | 3 | HCL |
| ↓ | CYANIDE | 500ml Poly | 1 | NaOH |
| | NUTRIENTS | " " | 1 | $H_2SO_4$ |
| | DISS METALS | " " | 1 | $HNO_3$ |
| | COMMON IONS | 1000ml " | 1 | NONE |
| | | | | |

Sample Time: 1145

Sampling Equipment: DISPOSABLE PRESSURE BAILER

Comments/Additional Information DISSOLVED METALS SAMPLE THRU .45 MICRON DRUM FILTER

| | |
|---|---|
| PRESSURE BAILER | $10.50 |
| FILTER – DRUM | $16.00 |

# GROUNDWATER SAMPLING LOG

1035 – 1600

| | |
|---|---|
| Project Name: BIG TIMBER L.F. | Well No: BT-6 |
| Project No: 9731053 | Sampled By: KM/MU |
| Date: 4-25-00 | Weather: P.C. CALM, ~50°F |

## WELL INFORMATION

| | | | |
|---|---|---|---|
| Depth of Well (ft) | 32.2′ | Casing Volume (gal) | .57 |
| M.P. Location | TOC PVC | Purge Volume (gal) | 1.71 |
| Depth to GW (ft) | 28.82′ | Product Thick. (ft) | NONE |
| Water Column (ft) | 3.38′ | Well Condition | GOOD – RECOVERY SLOW |
| Well Diameter (in) | 2″ | | |

## PURGE DATA

Start Purge Time:

Purge Equipment: DISPOSABLE BAILER

| | | | | |
|---|---|---|---|---|
| Time | 1040 | 1042 | 1044 | |
| Vol. Purged (gal) | 0 | 1 | 1.5 | |
| Flow Rate (gpm) | — | — | — | |
| pH | 6.10 | 6.52 | 7.30 | |
| SC (umhos/cm @ 25°C) | 381 µS | 341 | 342 | |
| T (°C) | 11.8 | 11.9 | 11.9 | |
| DO (mg/l) | — | — | — | |
| Water Color | Translucent Gray | → | → | |

## SAMPLE DATA

| Sample Number | Sample Analyses | Container | # Bottles | Preserv. |
|---|---|---|---|---|
| BT-6 | VOCs | 40 ml VOA | 3 | HCl |
| | CYANIDE | 500 ml POLY | 1 | NaOH |
| | NUTRIENTS | " " | 1 | $H_2SO_4$ |
| | COMMON IONS | " " | 1 | NONE |
| | DISS METALS | 1000 ml " | 1 | $HNO_3$ |
| | | | | |

Sample Time: 1550

Sampling Equipment:

Comments/Additional Information

| | |
|---|---|
| BAILER | 10.50 |
| FILTER | 16.00 |

# GROUNDWATER SAMPLING LOG

1240 –

| | |
|---|---|
| Project Name: BIGTIMBER LANDFILL | Well No: BT-7 |
| Project No: 9731053.100 | Sampled By: KM/ MLI |
| Date: 4-25-00 | Weather: OVERCAST, SPRINKLES, LT WIND ~50°F |

## WELL INFORMATION

| | | | |
|---|---|---|---|
| Depth of Well (ft) | 49.7' | Casing Volume (gal) | 1.65 |
| M.P. Location | TOC-PVC | Purge Volume (gal) | 4.95 |
| Depth to GW (ft) | 39.98' | Product Thick. (ft) | NONE |
| Water Column (ft) | 9.72 | Well Condition | GOOD |
| Well Diameter (in) | 2" | | |

## PURGE DATA

Start Purge Time: 1247

Purge Equipment: DISPOSABLE BAILER

| Time | 1301 | 1305 | 1308 | |
|---|---|---|---|---|
| Vol. Purged (gal) | 3 | 4 | 5 | |
| Flow Rate (gpm) | — | — | — | |
| pH | 7.43 | 7.48 | 7.52 | |
| SC (umhos/cm @ 25°C) | 746 uS | 758 | 755 | |
| T (°C) | 12.9 | 12.7 | 12.6 | |
| DO (mg/l) | — | — | — | |
| Water Color | TRANSLUCENT GREY BROWN | ⟶ | | |

## SAMPLE DATA

| Sample Number | Sample Analyses | Container | # Bottles | Preserv. |
|---|---|---|---|---|
| BT-7 | VOC | 40ml VOA | 3 | HCl |
| ↓ | CYANIDE | 500ml POLY | 1 | NaOH |
| | NUTRIENTS | " " | 1 | $H_2SO_4$ |
| | DISS METALS | " " | 1 | $HNO_3$ |
| | COMMON IONS | 1000ml " | 1 | NONE |
| | | | | |

Sample Time: 1330

Sampling Equipment: DISPOSABLE PRESSURE BAILER

Comments/Additional Information DISSOLVED METALS SAMPLE THRU .45 MICRON FILTER

PRES. BAILER 10.50
FILTER-DRUM 16.00

# APPENDIX D
## Laboratory Analytical Reports and Chain-of-Custody Documents

NORTHERN
Analytical Laboratories, Inc.

602 South 25th Street
P O Box 30315
Billings, MT 59107
Telephone: (406) 254-7226
Fax: (406) 254-1389

| | | | |
|---|---|---|---|
| **REPORT TO:** | ATTN: JEFF RICE<br>MAXIM TECHNOLOGIES, INC.<br>P O BOX 30615<br>BILLINGS MT 59107 | **DATE:**<br>**JOB NUMBER:**<br>**SHEET:**<br>**INVOICE NO.:** | May 15, 2000<br>87-910<br>1 of 32<br>40232 |

**REPORT OF:** Water Analysis – Big Timber Landfill – 9731053.100

---

**CASE NARRATIVE:**

On April 26, 2000, these water samples (laboratory numbers 2000040232-1 through 7) were received in our laboratory for analysis. Tests were conducted in accordance with EPA/600/4-79-020 *"Methods for Chemical Analysis of Water and Wastes"*; *"Standard Methods for the Examination of Water and Wastewater"*, 18th Edition and SW-846 *"Test Methods for Evaluating Solid Waste"*, 3rd Edition, updates I, II, IIA IIB, III.

The condition of the samples upon receipt at the laboratory is noted on the attached sample receipt checklist. Chain of custody documentation is enclosed.

The test results are shown on the following pages.

A <sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable.

Reviewed by Denise Jensen
Denise Jensen – Quality Assurance Coordinator

Attachments: Chain of Custody
Sample Receipt Checklist

caj

s a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of our clients and authorization for blication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. Test results apply specifically the samples tested only. The entire report shall not be reproduced, except in full, without the written approval of the laboratory. Samples will be sposed of after testing is completed unless other arrangements are agreed to in writing.

**Northern Analytical Laboratories, Inc.**

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

| | | | |
|---|---|---|---|
| **Sample No.:** 2000040232-1 | **Description:** BT-1S | | |
| **Date Received:** 04/26/2000 | | | |
| **Date Collected:** 04/25/2000 | **Collected by:** MAX UNDERWOOD | **Matrix:** WATER | |

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0508001016 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/08/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/08/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/08/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/08/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/08/2000 |

**Northern Analytical Laboratories, Inc.**

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-1 **Description:** BT-1S

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Toluene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/08/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/08/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/08/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/08/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/08/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/08/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/08/2000 |
| Acetone | <20 | ug/l | 8260B | 05/08/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/08/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 2-Hexanone (Methyl Butyl Ketone) 591-78-6 | <20 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 111 | % [75-113] | 8260B | 05/08/2000 |
| Toluene-d8 (Surrogate) | 98 | % [85-109] | 8260B | 05/08/2000 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % [90-114] | 8260B | 05/08/2000 |
| **MONTANA LANDFILL INORGANCIS** | | | | |
| Chloride as Cl | 129 | mg/l | 325.3 | 05/05/2000 |
| Sulfate as SO4 | 334 | mg/l | 9036 | 04/26/2000 |
| Chemical Oxygen Demand | 10 | mg/l | 410.2 | 05/05/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNC-MOD | 04/27/2000 |

KJH

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-1 **Description:** BT-1S

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 1420 | umhos/cm | 9050A | 04/26/2000 |
| pH | 7.6 | S.U. | 9041 | 04/26/2000 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/02/2000 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/08/2000 |
| Barium as Ba (Dissolved) | 0.03 | mg/l | 6020 | 05/02/2000 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/08/2000 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/02/2000 |
| Chromium as Cr (Dissolved) | 0.012 | mg/l | 6020 | 05/08/2000 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/08/2000 |
| Copper as Cu (Dissolved) | 0.002 | mg/l | 6020 | 05/10/2000 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/02/2000 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/08/2000 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 05/04/2000 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/08/2000 |
| Selenium as Se (Dissolved) | 0.039 | mg/l | 6020 | 05/08/2000 |
| Silver as Ag (Dissolved) | <0.0005 | mg/l | 6020 | 05/08/2000 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/10/2000 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/08/2000 |
| Zinc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 05/09/2000 |
| ICP/AA Digestion Date | NA | ---- | | |
| ICP-MS Digestion Date | NA | ---- | | |
| Mercury Digestion Date | ---- | ---- | 7470A | 05/04/2000 |
| Nitrate + Nitrite as N — | 4.47 | mg/l | 353.2 | 04/27/2000 |

KJH

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-2 **Description:** BT-2

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0508001017 | ---- | | |
| Benzene | <1 | ug/l | 8260B | 05/08/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/08/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/08/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/08/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/08/2000 |

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# Northern Analytical Laboratories, Inc.

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-2 **Description:** BT-2

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Toluene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/08/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/08/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/08/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/08/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/08/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/08/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/08/2000 |
| Acetone | <20 | ug/l | 8260B | 05/08/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/08/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 112 | % [75-113] | 8260B | 05/08/2000 |
| Toluene-d8 (Surrogate) | 96 | % [85-109] | 8260B | 05/08/2000 |
| 4-Bromofluorobenzene (Surrogate) | 102 | % [90-114] | 8260B | 05/08/2000 |
| **MONTANA LANDFILL INORGANCIS** | | | | |
| Chloride as Cl | 27 | mg/l | 325.3 | 05/05/2000 |
| Sulfate as SO4 | 150 | mg/l | 9036 | 04/26/2000 |
| Chemical Oxygen Demand | 19 | mg/l | 410.2 | 05/05/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNC-MOD | 04/27/2000 |

KJH

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-2 **Description:** BT-2

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 459 | umhos/cm | 9050A | 04/26/2000 |
| pH | 8.6 | S.U. | 9040 | 04/26/2000 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/02/2000 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/08/2000 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 05/02/2000 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/08/2000 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/02/2000 |
| Chromium as Cr (Dissolved) | 0.010 | mg/l | 6020 | 05/08/2000 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/08/2000 |
| Copper as Cu (Dissolved) | 0.018 | mg/l | 6020 | 05/10/2000 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/02/2000 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/08/2000 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 05/05/2000 |
| Nickel as Ni (Dissolved) | 0.03 | mg/l | 6020 | 05/08/2000 |
| Selenium as Se (Dissolved) | <0.005 | mg/l | 6020 | 05/08/2000 |
| Silver as Ag (Dissolved) | 0.0016 | mg/l | 6020 | 05/08/2000 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/10/2000 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/08/2000 |
| Zinc as Zn (Dissolved) | 0.02 | mg/l | 6010B | 05/09/2000 |
| ICP/AA Digestion Date | NA | ---- | | |
| ICP-MS Digestion Date | NA | ---- | | |
| Mercury Digestion Date | ---- | ---- | 7470A | 05/05/2000 |
| Nitrate + Nitrite as N | <0.05 | mg/l | 353.2 | 04/27/2000 |

**Northern Analytical Laboratories, Inc.**

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-3 **Description:** BT-6

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0508001018 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/08/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/08/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/08/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/08/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/08/2000 |

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-3 **Description:** BT-6

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Toluene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/08/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/08/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/08/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/08/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/08/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/08/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/08/2000 |
| Acetone | <20 | ug/l | 8260B | 05/08/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/08/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 104 | % [75-113] | 8260B | 05/08/2000 |
| Toluene-d8 (Surrogate) | 99 | % [85-109] | 8260B | 05/08/2000 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % [90-114] | 8260B | 05/08/2000 |
| **MONTANA LANDFILL INORGANCIS** | | | | |
| Chloride as Cl | 56 | mg/l | 325.3 | 05/05/2000 |
| Sulfate as SO4 | 98 | mg/l | 9036 | 04/26/2000 |
| Chemical Oxygen Demand | 21 | mg/l | 410.2 | 05/05/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNC-MOD | 04/27/2000 |

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-3 **Description:** BT-6

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 472 | umhos/cm | 9050A | 04/26/2000 |
| pH | 8.6 | S.U. | 9040 | 04/26/2000 |
| Antimony as Sb (Dissolved) | 0.005 | mg/l | 6020 | 05/02/2000 |
| Arsenic as As (Dissolved) | 0.006 | mg/l | 6020 | 05/08/2000 |
| Barium as Ba (Dissolved) | 0.02 | mg/l | 6020 | 05/02/2000 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/02/2000 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/02/2000 |
| Chromium as Cr (Dissolved) | 0.003 | mg/l | 6020 | 05/02/2000 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/02/2000 |
| Copper as Cu (Dissolved) | 0.004 | mg/l | 6020 | 05/02/2000 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/02/2000 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/08/2000 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 05/05/2000 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/02/2000 |
| Selenium as Se (Dissolved) | 0.011 | mg/l | 6020 | 05/08/2000 |
| Silver as Ag (Dissolved) | 0.0024 | mg/l | 6020 | 05/08/2000 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/10/2000 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/08/2000 |
| Zinc as Zn (Dissolved) | 0.06 | mg/l | 6010B | 05/09/2000 |
| ICP/AA Digestion Date | NA | ----- | | |
| ICP-MS Digestion Date | NA | ----- | | |
| Mercury Digestion Date | ----- | ----- | 7470A | 05/04/2000 |
| Nitrate + Nitrite as N | 0.07 | mg/l | 353.2 | 04/27/2000 |

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**Northern Analytical Laboratories, Inc.**

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-4 **Description:** BT-7

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0509001007 | ---- | | |
| Benzene | <1 | ug/l | 8260B | 05/09/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/09/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/09/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/09/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/09/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/09/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/09/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/09/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/09/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/09/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/09/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/09/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/09/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/09/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/09/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/09/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/09/2000 |

KJB

# Northern Analytical Laboratories, Inc.

**Client Name:** MAXIM - BILLINGS, MT
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-4 **Description:** BT-7
**Date Received:** 04/26/2000
**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/09/2000 |
| Toluene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 05/09/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/09/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/09/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/09/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/09/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/09/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/09/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/09/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/09/2000 |
| Acetone | <20 | ug/l | 8260B | 05/09/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/09/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/09/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 111 | % [75-113] | 8260B | 05/09/2000 |
| Toluene-d8 (Surrogate) | 100 | % [85-109] | 8260B | 05/09/2000 |
| 4-Bromofluorobenzene (Surrogate) | 100 | % [90-114] | 8260B | 05/09/2000 |
| **MONTANA LANDFILL INORGANCIS** | | | | |
| Chloride as Cl | 172 | mg/l | 325.3 | 05/05/2000 |
| Sulfate as SO4 | 231 | mg/l | 9036 | 04/26/2000 |
| Chemical Oxygen Demand | 10 | mg/l | 410.2 | 05/05/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNC-MOD | 04/28/2000 |

KJW

# Northern Analytical Laboratories, Inc.

**Client Name:** MAXIM - BILLINGS, MT
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-4 **Description:** BT-7
**Date Received:** 04/26/2000
**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 1170 | umhos/cm | 9050A | 04/26/2000 |
| pH | 7.6 | S.U. | 9040 | 04/26/2000 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/02/2000 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/08/2000 |
| Barium as Ba (Dissolved) | <0.02 | mg/l | 6020 | 05/02/2000 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/02/2000 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/02/2000 |
| Chromium as Cr (Dissolved) | 0.005 | mg/l | 6020 | 05/02/2000 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/02/2000 |
| Copper as Cu (Dissolved) | 0.036 | mg/l | 6020 | 05/02/2000 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/02/2000 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/08/2000 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 05/05/2000 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/02/2000 |
| Selenium as Se (Dissolved) | 0.012 | mg/l | 6020 | 05/08/2000 |
| Silver as Ag (Dissolved) | 0.0033 | mg/l | 6020 | 05/08/2000 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/10/2000 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/08/2000 |
| Zinc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 05/09/2000 |
| ICP/AA Digestion Date | NA | ----- | | |
| ICP-MS Digestion Date | NA | ----- | | |
| Mercury Digestion Date | ----- | ----- | 7470A | 05/05/2000 |
| Nitrate + Nitrite as N | <0.05 | mg/l | 353.2 | 04/27/2000 |

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-5 **Description:** TRIP BLANK

**Date Received:** 04/26/2000

**Date Collected:** 04/19/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0508001020 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/08/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/08/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/08/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/08/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Methylene chloride | 5 | ug/l | 8260B | 05/08/2000 |

**Sample No.:** 2000040232-5 **Description:** TRIP BLANK

**Date Received:** 04/26/2000

**Date Collected:** 04/19/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Toluene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/08/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/08/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/08/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/08/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/08/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/08/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/08/2000 |
| Acetone | <20 | ug/l | 8260B | 05/08/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/08/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 107 | % [75-113] | 8260B | 05/08/2000 |
| Toluene-d8 (Surrogate) | 102 | % [85-109] | 8260B | 05/08/2000 |
| 4-Bromofluorobenzene (Surrogate) | 105 | % [90-114] | 8260B | 05/08/2000 |

**Client Name:** MAXIM - BILLINGS, MT
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-6 **Description:** FIELD BLANK
**Date Received:** 04/26/2000
**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0508001023 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/08/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/08/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/08/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/08/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/08/2000 |

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**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-6 **Description:** FIELD BLANK

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Toluene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/08/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/08/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/08/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/08/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/08/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/08/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/08/2000 |
| Acetone | <20 | ug/l | 8260B | 05/08/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/08/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 102 | % [75-113] | 8260B | 05/08/2000 |
| Toluene-d8 (Surrogate) | 101 | % [85-109] | 8260B | 05/08/2000 |
| 4-Bromofluorobenzene (Surrogate) | 106 | % [90-114] | 8260B | 05/08/2000 |

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**Client Name:** MAXIM - BILLINGS, MT
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-7 **Description:** BT-101S duplicate BT-1S
**Date Received:** 04/26/2000
**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0508001024 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/08/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/08/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/08/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/08/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/08/2000 |

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-7 **Description:** BT-101S dupli BT-1S

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Toluene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/08/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/08/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/08/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/08/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/08/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/08/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/08/2000 |
| Acetone | <20 | ug/l | 8260B | 05/08/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/08/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 109 | % [75-113] | 8260B | 05/08/2000 |
| Toluene-d8 (Surrogate) | 102 | % [85-109] | 8260B | 05/08/2000 |
| 4-Bromofluorobenzene (Surrogate) | 102 | % [90-114] | 8260B | 05/08/2000 |
| **MONTANA LANDFILL INORGANCIS** | | | | |
| Chloride as Cl | 129 | mg/l | 325.3 | 05/05/2000 |
| Sulfate as SO4 | 337 | mg/l | 9036 | 04/26/2000 |
| Chemical Oxygen Demand | 12 | mg/l | 410.2 | 05/05/2000 |
| Cyanide as CN (Total) | <0.005 | mg/l | 4500CNC-MOD | 04/28/2000 |

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## Northern Analytical Laboratories, Inc.

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-7 **Description:** BT-101S

dupli BT-1S

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | 1410 | umhos/cm | 9050A | 04/26/2000 |
| pH | 7.6 | S.U. | 9040 | 04/26/2000 |
| Antimony as Sb (Dissolved) | <0.003 | mg/l | 6020 | 05/02/2000 |
| Arsenic as As (Dissolved) | <0.005 | mg/l | 6020 | 05/08/2000 |
| Barium as Ba (Dissolved) | 0.02 | mg/l | 6020 | 05/02/2000 |
| Beryllium as Be (Dissolved) | <0.001 | mg/l | 6020 | 05/08/2000 |
| Cadmium as Cd (Dissolved) | <0.0001 | mg/l | 6020 | 05/02/2000 |
| Chromium as Cr (Dissolved) | 0.017 | mg/l | 6020 | 05/08/2000 |
| Cobalt as Co (Dissolved) | <0.002 | mg/l | 6020 | 05/08/2000 |
| Copper as Cu (Dissolved) | 0.013 | mg/l | 6020 | 05/10/2000 |
| Iron as Fe (Dissolved) | <0.05 | mg/l | 6010B | 05/02/2000 |
| Lead as Pb (Dissolved) | <0.003 | mg/l | 6020 | 05/08/2000 |
| Mercury as Hg (Dissolved) | <0.0002 | mg/l | 7470A | 05/05/2000 |
| Nickel as Ni (Dissolved) | <0.02 | mg/l | 6020 | 05/08/2000 |
| Selenium as Se (Dissolved) | 0.041 | mg/l | 6020 | 05/08/2000 |
| Silver as Ag (Dissolved) | 0.001 | mg/l | 6020 | 05/08/2000 |
| Thallium as Tl (Dissolved) | <0.002 | mg/l | 6020 | 05/10/2000 |
| Vanadium as V (Dissolved) | <0.05 | mg/l | 6020 | 05/08/2000 |
| Zinc as Zn (Dissolved) | <0.02 | mg/l | 6010B | 05/09/2000 |
| ICP/AA Digestion Date | NA | --- | | |
| ICP-MS Digestion Date | NA | --- | | |
| Mercury Digestion Date | --- | --- | 7470A | 05/05/2000 |
| Nitrate + Nitrite as N | 4.46 | mg/l | 353.2 | 04/27/2000 |

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-8 **Description:** MATRIX SPIKE OF #1 BT-1S

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0508001021 | ---- | | |
| Benzene | 96 | % [72-104] | 8260B | 05/08/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/08/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/08/2000 |
| Chlorobenzene | 98 | % [78-110] | 8260B | 05/08/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/08/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethene | 97 | % [62-106] | 8260B | 05/08/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/08/2000 |

**Client Name:** MAXIM - BILLINGS, MT
**Project No.:** 9731053.100
**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-8 **Description:** MATRIX SPIKE OF #1 BT-1S
**Date Received:** 04/26/2000
**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Toluene | 96 | % [79-107] | 8260B | 05/08/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Trichloroethene | 97 | % [78-106] | 8260B | 05/08/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/08/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/08/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/08/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/08/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/08/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/08/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/08/2000 |
| Acetone | <20 | ug/l | 8260B | 05/08/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/08/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 109 | % [75-113] | 8260B | 05/08/2000 |
| Toluene-d8 (Surrogate) | 103 | % [85-109] | 8260B | 05/08/2000 |
| 4-Bromofluorobenzene (Surrogate) | 106 | % [90-114] | 8260B | 05/08/2000 |
| **MONTANA LANDFILL INORGANCIS** | | | | |
| Chloride as Cl | 97 | %[84-113] | 325.3 | 05/05/2000 |
| Sulfate as SO4 | 101 | % [89-110] | 9036 | 04/26/2000 |
| Chemical Oxygen Demand | 93 | % [90-111] | 410.2 | 05/05/2000 |
| Cyanide as CN (Total) | 64 | % [61-115] | 4500CNC-MOD | 04/28/2000 |

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-8 **Description:** MATRIX SPIKE OF #1 BT-1S

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | NA | ---- | | |
| pH | NA | ---- | - | |
| Antimony as Sb (Dissolved) | 100 | % [70-130] | 6020 | 05/02/2000 |
| Arsenic as As (Dissolved) | 110 | % [70-130] | 6020 | 05/08/2000 |
| Barium as Ba (Dissolved) | 88 | % [70-130] | 6020 | 05/02/2000 |
| Beryllium as Be (Dissolved) | 95 | % [70-130] | 6020 | 05/08/2000 |
| Cadmium as Cd (Dissolved) | 95 | % [70-130] | 6020 | 05/02/2000 |
| Chromium as Cr (Dissolved) | 95 | % [70-130] | 6020 | 05/08/2000 |
| Cobalt as Co (Dissolved) | 100 | % [70-130] | 6020 | 05/08/2000 |
| Copper as Cu (Dissolved) | 105 | % [70-130] | 6020 | 05/10/2000 |
| Iron as Fe (Dissolved) | 103 | % [87-115] | 6010B | 05/02/2000 |
| Lead as Pb (Dissolved) | 100 | % [70-130] | 6020 | 05/08/2000 |
| Mercury as Hg (Dissolved) | 110 | % [86-120] | 7470A | 05/04/2000 |
| Nickel as Ni (Dissolved) | 100 | % [70-130] | 6020 | 05/08/2000 |
| Selenium as Se (Dissolved) | 108 | % [70-130] | 6020 | 05/08/2000 |
| Silver as Ag (Dissolved) | 95 | % [70-130] | 6020 | 05/08/2000 |
| Thallium as Tl (Dissolved) | 105 | % [70-130] | 6020 | 05/10/2000 |
| Vanadium as V (Dissolved) | 105 | % [70-130] | 6020 | 05/08/2000 |
| Zinc as Zn (Dissolved) | 98 | % [82-118] | 6010B | 05/09/2000 |
| ICP/AA Digestion Date | NA | ---- | | |
| ICP-MS Digestion Date | NA | ---- | | |
| Mercury Digestion Date | ---- | ---- | 7470A | 05/04/2000 |
| Nitrate + Nitrite as N | 100 | % [89-113] | 353.2 | 04/27/2000 |

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-9
**Description:** MATRIX SPIKE DUPLICATE OF #1 BT-1S
**Date Received:** 04/26/2000
**Date Collected:** 04/25/2000
**Collected by:** MAX UNDERWOOD
**Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **MONTANA LANDFILL VOLATILE ORGANICS** | | | | |
| Data File Number-Volatiles | 0508001022 | ----- | | |
| Benzene | 91 | %[72-104] | 8260B | 05/08/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/08/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/08/2000 |
| Chlorobenzene | 95 | % [78-110] | 8260B | 05/08/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/08/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethene | 91 | % [62-106] | 8260B | 05/08/2000 |
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| c-1,3-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/08/2000 |

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-9
**Description:** MATRIX SPIKE DUPLICATE OF #1 BT-1S
**Date Received:** 04/26/2000
**Date Collected:** 04/25/2000
**Collected by:** MAX UNDERWOOD
**Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Styrene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Toluene | 92 | % [79-107] | 8260B | 05/08/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Trichloroethene | 94 | % [78-106] | 8260B | 05/08/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/08/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/08/2000 |
| Acrylonitrile | <10 | ug/l | 8260B | 05/08/2000 |
| Carbon disulfide | <5 | ug/l | 8260B | 05/08/2000 |
| Iodomethane (Methyl Iodide) | <5 | ug/l | 8260B | 05/08/2000 |
| t-1,4-Dichloro-2-butene | <5 | ug/l | 8260B | 05/08/2000 |
| Vinyl acetate | <10 | ug/l | 8260B | 05/08/2000 |
| Acetone | <20 | ug/l | 8260B | 05/08/2000 |
| Methyl Ethyl Ketone (2-Butanone) | <20 | ug/l | 8260B | 05/08/2000 |
| 4-Methyl-2-Pentanone (Methyl Isobutyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 2-Hexanone (Methyl Butyl Ketone) | <20 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane-d4 (Surrogate) | 101 | % [75-113] | 8260B | 05/08/2000 |
| Toluene-d8 (Surrogate) | 102 | % [85-109] | 8260B | 05/08/2000 |
| 4-Bromofluorobenzene (Surrogate) | 106 | % [90-114] | 8260B | 05/08/2000 |
| **MONTANA LANDFILL INORGANCIS** | | | | |
| Chloride as Cl | 102 | % [84-113] | 325.3 | 05/05/2000 |
| Sulfate as SO4 | 101 | % [89-110] | 9036 | 04/26/2000 |
| Chemical Oxygen Demand | 93 | % [90-111] | 410.2 | 05/05/2000 |
| Cyanide as CN (Total) | 67 | % [61-115] | 4500CNC-MOD | 04/28/2000 |

**Client Name:** MAXIM - BILLINGS, MT

**Project No.:** 9731053.100

**Project Name:** BIG TIMBER LANDFILL

**Sample No.:** 2000040232-9 **Description:** MATRIX SPIKE DUPLICATE OF #1 BT-1S

**Date Received:** 04/26/2000

**Date Collected:** 04/25/2000 **Collected by:** MAX UNDERWOOD **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| Electrical Conductivity | NA | ----- | | |
| pH | NA | ----- | | |
| Antimony as Sb (Dissolved) | 100 | % [70-130] | 6020 | 05/02/2000 |
| Arsenic as As (Dissolved) | 110 | % [70-130] | 6020 | 05/08/2000 |
| Barium as Ba (Dissolved) | 88 | % [70-130] | 6020 | 05/02/2000 |
| Beryllium as Be (Dissolved) | 95 | % [70-130] | 6020 | 05/08/2000 |
| Cadmium as Cd (Dissolved) | 95 | % [70-130] | 6020 | 05/02/2000 |
| Chromium as Cr (Dissolved) | 100 | % [70-130] | 6020 | 05/08/2000 |
| Cobalt as Co (Dissolved) | 100 | % [70-130] | 6020 | 05/08/2000 |
| Copper as Cu (Dissolved) | 130 | % [70-130] | 6020 | 05/10/2000 |
| Iron as Fe (Dissolved) | 104 | % [87-115] | 6010B | 05/02/2000 |
| Lead as Pb (Dissolved) | 105 | % [70-130] | 6020 | 05/08/2000 |
| Mercury as Hg (Dissolved) | 115 | % [86-120] | 7470A | 05/04/2000 |
| Nickel as Ni (Dissolved) | 100 | % [70-130] | 6020 | 05/08/2000 |
| Selenium as Se (Dissolved) | 108 | % [70-130] | 6020 | 05/08/2000 |
| Silver as Ag (Dissolved) | 95 | % [70-130] | 6020 | 05/08/2000 |
| Thallium as Tl (Dissolved) | 125 | % [70-130] | 6020 | 05/10/2000 |
| Vanadium as V (Dissolved) | 105 | % [70-130] | 6020 | 05/08/2000 |
| Zinc as Zn (Dissolved) | 94 | % [82-118] | 6010B | 05/09/2000 |
| ICP/AA Digestion Date | NA | ---- | | |
| ICP-MS Digestion Date | NA | ---- | | |
| Mercury Digestion Date | ----- | ----- | 7470A | 05/04/2000 |
| Nitrate + Nitrite as N | 99 | % [89-113] | 353.2 | 04/27/2000 |

**Client Name:** QUALITY ASSURANCE

**Project No.:** 59-100

**Project Name:** 8260 QUALITY ASSURANCE

**Sample No.:** 2000050070-2 **Description:** 8260 METHOD BLANK

**Date Received:** 05/08/2000

**Date Collected:** ----- **Collected by:** LABORATORY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **EPA METHOD 8260** | | | | |
| Data File Number-Volatiles | 0508001015 | ----- | | |
| Benzene | <1 | ug/l | 8260B | 05/08/2000 |
| Bromobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/08/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| n-Butylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| sec-Butylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| t-Butylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/08/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/08/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/08/2000 |
| 4-Chlorotoluene | <1 | ug/l | 8260B | 05/08/2000 |
| 2-Chlorotoluene | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,3-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |

KJH

**Client Name:** QUALITY ASSURANCE
**Project No.:** 59-100
**Project Name:** 8260 QUALITY ASSURANCE

**Sample No.:** 2000050070-2 **Description:** 8260 METHOD BLANK
**Date Received:** 05/08/2000
**Date Collected:** ----- **Collected by:** LABORATORY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,3-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| 2,2-Dichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1-Dichloropropene | <1 | ug/l | 8260B | 05/08/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Hexachlorobutadiene | <1 | ug/l | 8260B | 05/08/2000 |
| Cumene (Isopropylbenzene) | <1 | ug/l | 8260B | 05/08/2000 |
| Isopropyltoluene | <1 | ug/l | 8260B | 05/08/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/08/2000 |
| n-Propylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Naphthalene | <5 | ug/l | 8260B | 05/08/2000 |
| Styrene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Toluene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,4-Trichlorobenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/08/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 05/08/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/08/2000 |
| 1,2,4-Trimethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| 1,3,5-Trimethylbenzene | <1 | ug/l | 8260B | 05/08/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/08/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/08/2000 |

KJH

**Client Name:** QUALITY ASSURANCE
**Project No.:** 59-100
**Project Name:** 8260 QUALITY ASSURANCE

**Sample No.:** 2000050070-2 **Description:** 8260 METHOD BLANK
**Date Received:** 05/08/2000
**Date Collected:** ----- **Collected by:** LABORATORY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surrogate) | 102 | % [75-113] | 8260B | 05/08/2000 |
| Toluene-d8 (Surrogate) | 98 | % [85-109] | 8260B | 05/08/2000 |
| 4-Bromofluorobenzene (Surrogate) | 106 | % [90-114] | 8260B | 05/08/2000 |

**Client Name:** QUALITY ASSURANCE

**Project No.:** 59-100

**Project Name:** 8260 QUALITY ASSURANCE

**Sample No.:** 2000050070-3 **Description:** 8260 METHOD BLANK
**Date Received:** 05/09/2000
**Date Collected:** ----- **Collected by:** LABORATORY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| **EPA METHOD 8260** | | | | |
| Data File Number-Volatiles | 0509001004 | ---- | | |
| Benzene | <1 | ug/l | 8260B | 05/09/2000 |
| Bromobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| Bromochloromethane | <1 | ug/l | 8260B | 05/09/2000 |
| Bromodichloromethane | <1 | ug/l | 8260B | 05/09/2000 |
| Bromoform | <1 | ug/l | 8260B | 05/09/2000 |
| Bromomethane | <1 | ug/l | 8260B | 05/09/2000 |
| n-Butylbenzene | <1 | ug/l | 8260B | 05/09/2000 |
| sec-Butylbenzene | <1 | ug/l | 8260B | 05/09/2000 |
| t-Butylbenzene | <1 | ug/l | 8260B | 05/09/2000 |
| Carbon tetrachloride | <1 | ug/l | 8260B | 05/09/2000 |
| Chlorobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| Chloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| Chloroform | <1 | ug/l | 8260B | 05/09/2000 |
| Chloromethane (Methyl chloride) | <1 | ug/l | 8260B | 05/09/2000 |
| 4-Chlorotoluene | <1 | ug/l | 8260B | 05/09/2000 |
| 2-Chlorotoluene | <1 | ug/l | 8260B | 05/09/2000 |
| Dibromochloromethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dibromo-3-chloropropane | <5 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dibromoethane | <1 | ug/l | 8260B | 05/09/2000 |
| Dichlorodifluoromethane | <1 | ug/l | 8260B | 05/09/2000 |
| Dibromomethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dichlorobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,3-Dichlorobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,4-Dichlorobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1-Dichloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dichloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1-Dichloroethene | <1 | ug/l | 8260B | 05/09/2000 |

**Client Name:** QUALITY ASSURANCE

**Project No.:** 59-100

**Project Name:** 8260 QUALITY ASSURANCE

**Sample No.:** 2000050070-3 **Description:** 8260 METHOD BLANK

**Date Received:** 05/09/2000

**Date Collected:** ----- **Collected by:** LABORATORY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| c-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/09/2000 |
| t-1,2-Dichloroethene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2-Dichloropropane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,3-Dichloropropane | <1 | ug/l | 8260B | 05/09/2000 |
| 2,2-Dichloropropane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1-Dichloropropene | <1 | ug/l | 8260B | 05/09/2000 |
| Ethylbenzene | <1 | ug/l | 8260B | 05/09/2000 |
| Hexachlorobutadiene | <1 | ug/l | 8260B | 05/09/2000 |
| Cumene (Isopropylbenzene) | <1 | ug/l | 8260B | 05/09/2000 |
| Isopropyltoluene | <1 | ug/l | 8260B | 05/09/2000 |
| Methylene chloride | <5 | ug/l | 8260B | 05/09/2000 |
| n-Propylbenzene | <1 | ug/l | 8260B | 05/09/2000 |
| Naphthalene | <5 | ug/l | 8260B | 05/09/2000 |
| Styrene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1,1,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1,2,2-Tetrachloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| Tetrachloroethene | <1 | ug/l | 8260B | 05/09/2000 |
| Toluene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2,3-Trichlorobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2,4-Trichlorobenzene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1,1-Trichloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,1,2-Trichloroethane | <1 | ug/l | 8260B | 05/09/2000 |
| Trichloroethene | <1 | ug/l | 8260B | 05/09/2000 |
| Trichlorofluoromethane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2,3-Trichloropropane | <1 | ug/l | 8260B | 05/09/2000 |
| 1,2,4-Trimethylbenzene | <1 | ug/l | 8260B | 05/09/2000 |
| 1,3,5-Trimethylbenzene | <1 | ug/l | 8260B | 05/09/2000 |
| Vinyl chloride | <1 | ug/l | 8260B | 05/09/2000 |
| Total Xylenes | <2 | ug/l | 8260B | 05/09/2000 |

**Client Name:** QUALITY ASSURANCE

**Project No.:** 59-100

**Project Name:** 8260 QUALITY ASSURANCE

**Sample No.:** 2000050070-3 **Description:** 8260 METHOD BLANK

**Date Received:** 05/09/2000

**Date Collected:** ----- **Collected by:** LABORATORY **Matrix:** WATER

| Laboratory Test | Measured Value | Test Units | Test Method | Date of Analysis |
|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surrogate) | 100 | % [75-113] | 8260B | 05/09/2000 |
| Toluene-d8 (Surrogate) | 102 | % [85-109] | 8260B | 05/09/2000 |
| 4-Bromofluorobenzene (Surrogate) | 104 | % [90-114] | 8260B | 05/09/2000 |

CHAIN OF CUSTODY RECORD

**NORTHERN**
**Analytical Laboratories, Inc.**

602 South 25th Street
Billings, Montana 59101

Project or Site Name

9731053.100
Project Number

MAX UNDERWOOD
Sampler Name (Printed)

JEFF RICE
Contact Name

Report to (Firm or Agency)

BILLINGS MT
Address

City State Zip

248-9161
Phone Fax

| DATE COLLECTED | TIME COLLECTED | SAMPLE LOCATION OR DESCRIPTION | COMP OR GRAB | SAMPLE MATRIX | NO. OF CONTAINERS | ANALYSIS REQUIRED<br>VOCs | CYANIDE | NUTRIENTS | COMMON IONS | DISSOLVED METALS | | | NOTES | LAB NUMBER<br>40232 ✓ CC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-25-00 | 1230 | BT-1S | GRAB | H2O | 7 | X | X | X | X | X | | | | 1 |
| | 1145 | BT-2 | | | 7 | X | X | X | X | X | | | | 2 |
| | 1550 | BT-6 | | | 7 | X | X | X | X | X | | | | 3 |
| ↓ | 1330 | BT-7 | | | 7 | X | X | X | X | X | | | | 4 |
| 4-19-00 | 1535 | TRIP BLANK | | | 3 | X | | | | | | | HOLD (RUN IF FIELD BLANK IS POSITIVE) | 5 |
| 4-25-00 | 1400 | FIELD BLANK | | | 3 | X | | | | | | | | 6 |
| ↓ | 1230 | BT-101S | ↓ | ↓ | 7 | X | X | X | X | X | | | | 7 |
| | | | | | | | | MS #1 | | | | | | 8 |
| | | | | | | | | MSD #1 | | | | | | 9 |

| | | | | |
|---|---|---|---|---|
| Relinquished by: Max Underwood | Date 4/26/00 | Time 0830 | Received by: MWalter | MONTANA TABLE 1 PARAMETERS |
| Relinquished by: | Date | Time | Received by: | |
| Relinquished by: | Date | Time | Received by: | |

**NORTHERN**
**Analytical Laboratories, Inc.**

# SAMPLE RECEIPT CHECKLIST

Dear Valued Client: This checklist documents the condition of your sample(s) as it (they) arrived at our lab. Please review it and familiarize yourself with its contents. Should you have any questions or comments, please contact us. Thank you for your use of our services.

Client Name Maxim- Billings
Project Big Timber Landfill
Laboratory Number(s) 40232
Checklist Completed by GR 4-26-00
Initials / Date

Date/Time Received 4-26-00 0830
Date / Time
Received by MW
Carrier Name Hand
Sample Type H2O

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| | YES | NO |
|---|---|---|
| 1. Shipping container in good condition? | X | |
| 2. Custody seals present on shipping container?<br>Condition: Intact ____ Broken ____ | | X |
| 3. Chain of custody present? | X | |
| 4. Chain of custody signed when relinquished and received? | X | |
| 5. Chain of custody agrees with sample labels? | X | |
| 6. Custody seals on sample bottles?<br>Condition: Intact ____ Broken ____ | | X |
| 7. Samples in proper container/bottle?* | X | |
| 8. Sample containers intact?* | X | |
| 9. Sufficient sample volume for indicated test?* | X | |
| 10. [✓ Ice]/Frozen Blue Ice present in shipping container? (circle one) | X | |
| container temperature 1. ~~4~~ 5.0°C 2. ____ 3. ____<br>* (if <0 or>10) GR 4/26/00 | | |
| 11. All samples rec'd within holding time?* | X | |
| 12. VOA vials have zero headspace?<br>* (if contains >5mm headspace) | X | |
| 13. Trip Blank received? | X | |

| | YES | NO |
|---|---|---|
| ⑭ pH check performed by: Analyst + GR | | |
| 15. Metals bottle(s) pH <2? | X GR | |
| 16. Nutrient bottle(s) pH <2? | X | |
| 17. Cyanide bottle(s) pH >12? | X | |
| 18. Sulfide bottle(s) pH >9? | NA | |
| 19. TOC bottle(s) pH <2? | | |
| 20. Phenolics bottle(s) pH <2? | | |
| 21. Oil & grease bottle(s) pH <2?<br>(checked by analyst) | | |
| 22. DRO/418.1 bottle(s) pH <2?<br>(checked by analyst) | | |
| 23. Volatiles (VOA) pH <2?<br>(VOA pH checked by analyst) | ✓ DD | |
| 24. Herbicides (515) pH <2?<br>(checked by analyst) | NA | |
| 25. Semivolatiles (525) pH <2?<br>(checked by analyst) | | |
| 26. Client contacted? | | |
| 27. Person contacted | | |
| 28. Date contacted | | |

**NOTES:** **Samples may be affected when not transported at the temperature recommended by the EPA for the test you've selected. Please contact the lab if you have concerns about the temperature of your samples.**

*** Critical item - if marked "NO" contact lab manager.**

**COMMENTS:** ____________________